

Prospectus | 2016-2017



INDIAN INSTITUTE OF TECHNOLOGY DELHI

VISION

To contribute to India and the World through excellence in scientific and technical education and research; to serve as a valuable resource for industry and society; and remain a source of pride for all Indians.

MISSION

To generate new knowledge by engaging in cutting-edge research and to promote academic growth by offering state-of-the-art undergraduate, postgraduate and doctoral programmes.

To identify, based on an informed perception of Indian, regional and global needs, areas of specialization upon which the Institute can concentrate.

To undertake collaborative projects which offer opportunities for long-term interaction with academia and industry.

To develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge in a range of professions.

VALUES

- Academic integrity and accountability.
- Respect and tolerance for the views of every individual.
- Attention to issues of national relevance as well as of global concern.
- Breadth of understanding, including knowledge of the human sciences.
- Appreciation of intellectual excellence and creativity.
- An unfettered spirit of exploration, rationality and enterprise.

Prospectus

2016-2017

Indian Institute of Technology Delhi

This book is available at the IIT Delhi Website : <http://www.iitd.ac.in>

Link : <http://www.iitd.ac.in/content/curriculum-info>

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1. INTRODUCTION

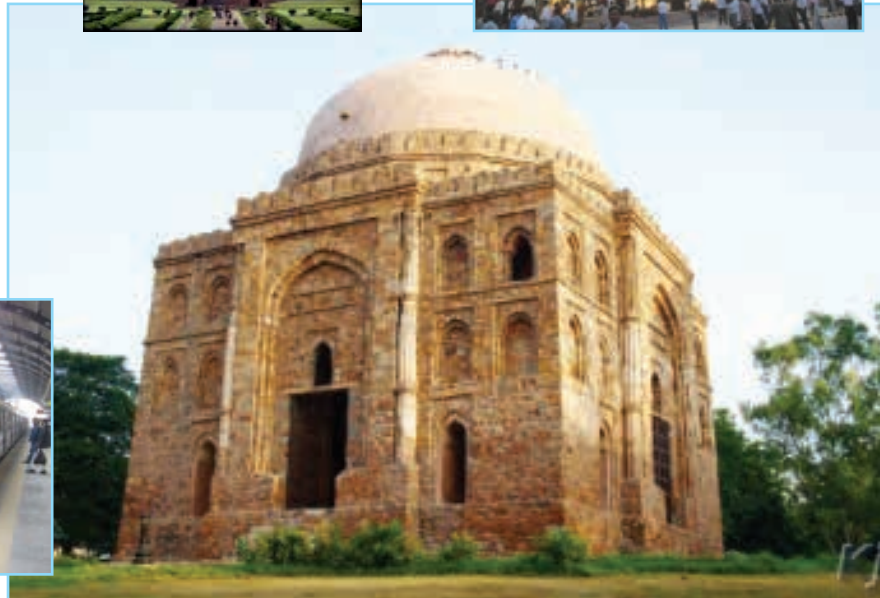
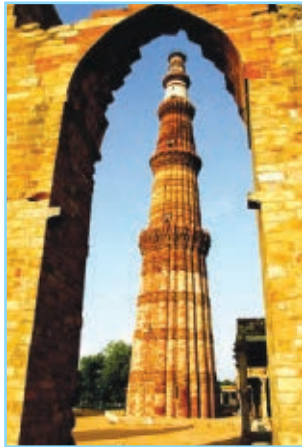
Indian Institute of Technology Delhi is one of the Nineteen IITs created to be Centres of Excellence for training, research and development in science, engineering and technology in India.

Established as College of Engineering in 1961, the Institute was later declared as an Institution of National Importance under the “Institutes of Technology (Amendment) Act, 1963” and was renamed as “Indian Institute of Technology Delhi”. It was then accorded the status of a Deemed University with powers to decide its own academic policy, to conduct its own examinations, and to award its own degrees.



Since its inception, over 40096 have graduated from IIT Delhi in various disciplines including Engineering, Physical Sciences, Management and Humanities & Social Sciences. Of these, nearly 4101 received Ph.D. degrees. The number of students who graduated with B.Tech. degree is over 13326. The rest obtained Master's Degree in Engineering, Sciences and Business Administration. These alumni today work as scientists, technologists, business managers and entrepreneurs. There are several alumni who have moved away from their original disciplines and have taken to administrative services, active politics or are with NGOs. In doing so, they have contributed significantly to building of this nation, and to industrialization around the world.

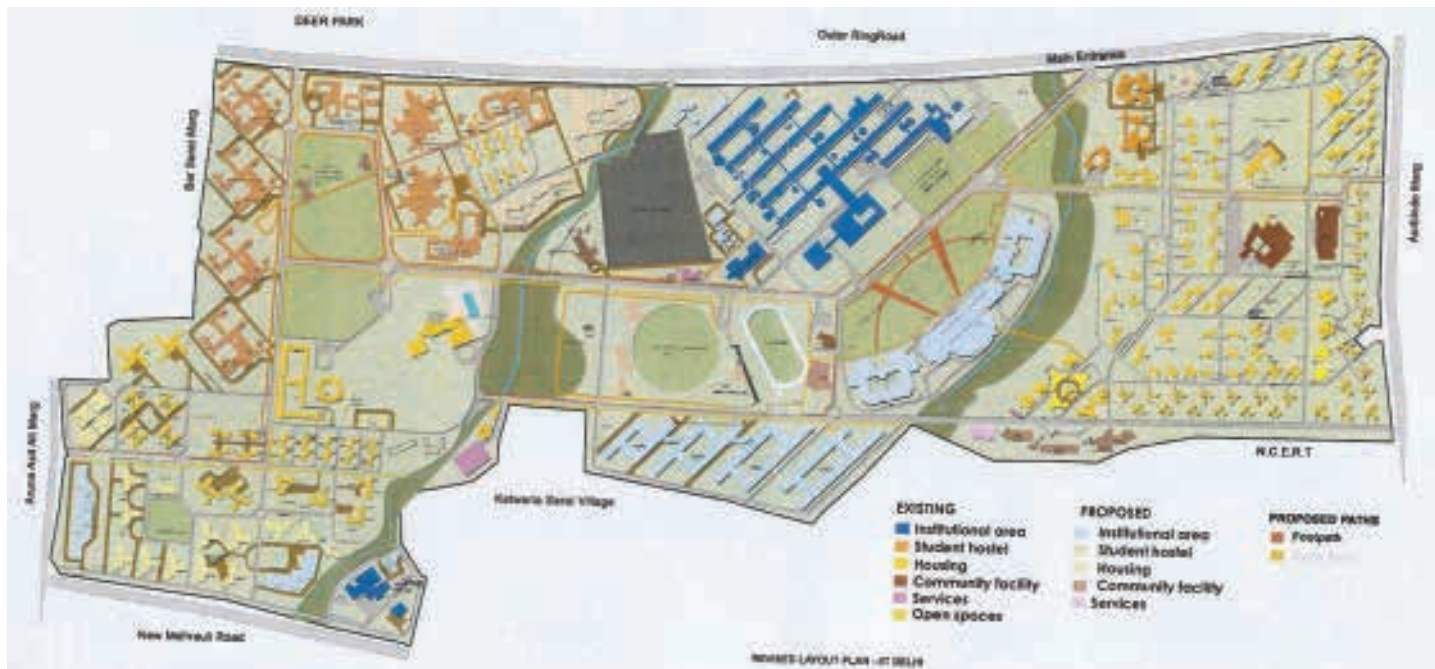
IIT Delhi is situated in Hauz Khas in South Delhi, which is a landmark place in the colourful and chequered history of Delhi. Bounded by the Sri Aurobindo Marg on the east, the Jawaharlal Nehru University Complex on the west, the National Council of Educational Research and Training on the south, and the Outer Ring Road on the north, the Institute campus is flanked by Qutub Minar and the Hauz Khas monuments.



Well connected to the major city centres by open and wide roads, the Institute campus is about 19 km. away from the Delhi Main Railway Station, 14 km. from the New Delhi Railway Station, 21 km. from the Inter-State Bus Terminal (Kashmere Gate) and 10 km. from Delhi Airport. The nearest Metro Rail Station is Hauz Khas.

The campus of the Institute extends to an area of 320 acres. With many topographical features, imaginatively laid out with picturesque landscape, numerous buildings of various nature and stature, and clean and wide roads, the campus presents a spectacle of harmony in architecture and natural beauty.

The campus area has been divided into four functional zones : (i) Residential zone for students; (ii) Residential zone for the faculty and other supporting staff; (iii) Academic zone for academic buildings and workshops; and (iv) Cultural-cum-social and recreational zone for students.



The campus also offers amenities like Staff Clubs, Hospital, Shopping Centre, Banks, Post Office, Telecom Centre, Community Centre, Stadium, Playing Fields, etc. The Students Activities Centre provides all facilities for students' extra-curricular activities and physical development. The central double-storied recreation block with a swimming pool and a gymnasium hall offers amenities such as squash courts, hobbies workshops/seminar rooms, music rooms and other multipurpose rooms for reading and indoor games. The amphitheater with large capacity constructed in modern style is an added amenity to the centre.

ADMINISTRATION

IIT Delhi is an autonomous statutory organization functioning within the “Institutes of Technology Act” as amended by “The Institutes of Technology (Amendment) Act, 1963”.

The Indian Institutes of Technology are administered centrally by the IIT Council, an apex body established by the Government of India to co-ordinate the activities of these Institutes.

The Hon’ble Minister for Human Resource Development of the Government of India is the Chairman of the IIT Council. Each Indian Institute of Technology has a Board of Governors responsible for its overall administration and control.

CHAIRMAN, BOG



Shri Kumar Mangalam Birla is the Chairman, Board of Governors of IIT Delhi.

Mr. Kumar Mangalam Birla took over as Chairman of Aditya Birla Group in 1995, at the age of 28. From a turnover of US\$ 2 billion and operations in 8 countries in 1995, today under his stewardship, the Group’s revenues are in excess of US\$ 41 billion with operations straddling 36 countries. He has made 36 acquisitions globally – the highest by an Indian multinational.

An iconic figure, Mr. Birla has won several accolades, to cite a few – the International Advertising Association’s (IAA) “CEO of the Year Award 2016”; US India Business Council (USIBC) 2014, “Global Leadership Award”; Economic Times “Business Leader Award” in 2003 and 2013; Forbes India Leadership Award – Flagship Award “Entrepreneur of the Year 2012; NDTV Profit Business Leadership Awards 2012, “Most Inspiring Leader”; CNBCTV18 IBLA “Business Leader for Taking India Abroad 2012”; CNN-IBN “Indian of the Year Award 2010”; JRD Tata “Leadership Award 2008”; NDTV’s “Global Indian Leader of the Year 2007”.

An educationist, Mr. Birla is the Chancellor of Birla Institute of Technology & Science (BITS). He is Chairman of IIT, Delhi, and Chairman of Rhodes India Scholarship Committee for Oxford University. He serves on London Business School’s Asia Pacific Advisory Board and is an Honorary Fellow of the London Business School.

A Chartered Accountant, Mr. Birla earned an MBA from London Business School.

Mr. Birla and his wife, Mrs. Neerja Birla, have three children, Ananya, Aryaman Vikram and Advaitesha.

DIRECTOR



Prof. V. Ramgopal Rao is the Director of IIT Delhi.

Before joining IIT Delhi, Prof. Rao served as a P.K. Kelkar Chair Professor for Nanotechnology in the Department of Electrical Engineering at IIT Bombay. He has over 400 publications and is an inventor on 32 patents (including 12 issued US patents) and patent applications. He is also a co-founder of the company NanoSniff Technologies Pvt. Ltd.

Prof. Rao’s work is recognized with many awards and honors in the country and abroad, which include Shanti Swarup Bhatnagar Prize in Engineering Sciences in 2005, the Infosys Prize in 2013, the Swarnajayanti Fellowship Award from the Department of Science & Technology, IBM Faculty award, Best Research Award from the Intel Asia Academic Forum, Techno-Mentor award from the Indian Semiconductor Association, DAE-SRC Outstanding Research Investigator Award, NASI-Reliance Platinum Jubilee Award, Excellence in Research Award from IIT Bombay, JC Bose National Fellowship and CNR Rao National Nanoscience Award.

Prof. Rao is a Fellow of INAE, INSA, NASc and IASc.

THE SENATE

The Senate decides the academic policy of the Institute, and approves curriculum, courses and examination results. It appoints committees to look into specific academic matters arising from time to time. The teaching, training and research activities of various departments at the Institute are constantly under review to improve both facilities and standard. The Director of the Institute is the Chairman of the Senate.

Financial advice to the Institute is rendered by the Finance Committee. Similarly, there is a Buildings and Works Committee to advise on matters relating to buildings and works activity. These committees are appointed by the Board of Governors. In addition, there are a number of other committees like the Board of Academic Programmes, Board of Educational Research and Planning are appointed by the Senate to help the administration in the efficient running of the Institute.

2. ACADEMICS

IIT Delhi provides science-based engineering education with a view to produce quality engineer-scientists. The curriculum provides broad based knowledge and simultaneously builds a temper for the life long process of learning and exploring.

2.1 ACADEMIC SYSTEM

At the undergraduate level, a student needs to do compulsory foundation courses in the areas of basic sciences, humanities and social sciences and engineering sciences apart from departmental requirements. At postgraduate level, several specializations, in the form of various M.S., M.Tech., M.B.A., M.Des. D.I.I.T., and M.Sc., are available and the students get an exposure and training in research in their chosen fields. The Institute has a strong Ph.D. programmes and the students carry out advanced research under the guidance of the members of the Institute faculty.

The Institute undertakes a major revision of its curriculum periodically. From the academic session 2013-14, a new undergraduate curriculum has been in place and the new postgraduate curriculum has been implemented from the academic session 2015-16.

The Institute follows the semester system. An academic year runs from July through June next year and comprises two semesters. Typically, the 1st semester starts in the last week of July and ends in the 1st week of December; and the 2nd semester starts in the first week of January and ends in the 2nd week of May. Additionally, the summer semester which starts in the 3rd week of May and ends in the 2nd week of July, is utilised in some exceptional cases. Detailed activities are given in the Semester Schedule that is available before the start of every semester.

2.2 ACADEMIC STRUCTURE

The major academic units of the Institute are the Departments, Centres and the Schools. Interdisciplinary research is organized in programmes. The various academic units are listed below, and details are given latter in this document. The activities of Departments include teaching at all levels and research. The Centres focus on interdisciplinary research and some teaching mostly at the postgraduate level.

Departments

Department of Applied Mechanics
Department of Biochemical Engineering and Biotechnology
Department of Chemical Engineering
Department of Chemistry
Department of Civil Engineering
Department of Computer Science and Engineering
Department of Electrical Engineering
Department of Humanities and Social Sciences
Department of Management Studies
Department of Mathematics
Department of Mechanical Engineering
Department of Physics
Department of Textile Technology

Schools

Amar Nath and Shashi Khosla School of Information Technology
Bharti School of Telecommunication Technology and Management
School of Biological Sciences

Centres

Centre for Applied Research in Electronics
Centre for Atmospheric Sciences
Centre for Biomedical Engineering
Centre for Energy Studies
Industrial Tribology Machine Dynamics Maintenance Centre
Instrument Design and Development Centre
Centre for Polymer Science and Engineering
Centre for Rural Development and Technology
National Resource Centre for Value Education in Engineering

Interdisciplinary Research Programmes

Transportation Research and Injury Prevention Programme
Opto-Electronics and Optical Communication Research Programme



2.3 RESEARCH AND INNOVATION

IIT Delhi places strong emphasis on research and development, and innovation. Faculty members undertake research in the fields of their interest. Many postgraduate students and some undergraduate students are also involved in these activities, as the curriculum provides facilities for the same. While some research is funded by the Institute, majority of research activities / projects are funded by sponsoring agencies and / or industries. All projects funded by government agencies and some industry funded projects are managed through the Institute's Industrial Research and Development (IRD) Unit. Innovative technology development and industrial outreach are also facilitated by the Foundation for Innovation and Technology Transfer (FITT), a non-profit society associated with IIT Delhi and located on the campus.

2.4 COLLABORATIONS

IIT Delhi is actively involved in collaborative programmes with industry, academia and governments at national and international level to remain at the forefront of scientific and technological developments and also to share knowledge for mutual benefit. The Institute has more than hundred Memoranda of Understanding established with different organizations / institutions from countries all over the world which include Australia, Canada, China, Ethiopia, France, Germany, Japan, Korea, Switzerland, UK and USA. A large number of collaborative projects and student exchange programmes are active under these agreements.



At national level, the Institute has agreements with about fifty organizations / institutions which include Bharti Enterprises, C-DAC, Media Lab (Asia), TCS, DMRC, DAE, MHRD etc. Besides, the Institute has been undertaking Consultancy Assignments with International Organisations including Japan Automobile Research Institute, Japan; LG Electronics Inc, Korea; Common Fund for Commodities, Netherlands; INFRAS, Switzerland; Thai Acrylic Fibre Company Limited, Thailand; Marvel Chemicals Ltd, UK; PPG Industries Inc., USA; United Technologies Corp./ Pratt & Whitney, USA; Solidcore Systems Inc., USA; Gulf Coast Technical Service, USA; Corning Inc., USA; Biomorphic VLSI Inc., USA; and Universities / Institutions abroad.

2.5 STUDENT EXCHANGE PROGRAMMES

IIT Delhi promotes exchange of students with premier institutions in India and abroad at UG, PG and Ph.D. levels. At the international level, the exchange programme has been established with institutions like IMT France, INSA Toulouse France, INSA Lyon France, KTH Sweden, City University Hong Kong, EPFL Switzerland, Ecole Centrale Paris France, TU9 Institutes Germany, NTHU Taiwan and UBC Canada. Apart from these, I.I.T. Delhi is also one of the partner institutions under India4EU programme of the ERASMUS MUNDUS project of European Commission under which active student exchange is undertaken with European partner institutions.



2.6 ACADEMIC PROGRAMMES

IIT Delhi offers a variety of academic programmes for students with a wide range of backgrounds leading to the degrees listed below.

Doctor of Philosophy: (Ph.D.)

All Departments, Centres and Schools offer Ph.D. programmes.

Master of Technology: (M.Tech.)

M.Tech. in Engineering Mechanics

M.Tech. in Design Engineering

M.Tech. in Chemical Engineering

M.Tech. in Molecular Engineering : Chemical Synthesis & Analysis

M.Tech. in Geotechnical and Geoenvironmental Engineering

M.Tech. in Rock Engineering and Underground Structures

M.Tech. in Structural Engineering

M.Tech. in Water Resources Engineering

M.Tech. in Construction Engineering and Management

M.Tech. in Construction Technology and Management

M.Tech. in Environmental Engineering and Management

M.Tech. in Transportation Engineering

M.Tech. in Computer Science and Engineering

M.Tech. in Communications Engineering

M.Tech. in Computer Technology

M.Tech. in Control and Automation

M.Tech. in Integrated Electronics and Circuits

M.Tech. in Power Electronics, Electrical Machines and Drives

M.Tech. in Power Systems

M.Tech. in Design of Mechanical Equipment

M.Tech. in Industrial Engineering

M.Tech. in Production Engineering

M.Tech. in Thermal Engineering

M.Tech. in Applied Optics

M.Tech. in Solid State Materials

M.Tech. in Fibre Science & Technology

M.Tech. in Textile Engineering

M.Tech. in Radio Frequency Design and Technology

M.Tech. in Atmospheric-Oceanic Science and Technology

M.Tech. in Energy Studies

M.Tech. in Industrial Tribology and Maintenance Engineering

M.Tech. in Instrument Technology

M.Tech. in Optoelectronics and Optical Communication

M.Tech. in Polymer Science and Engineering

M.Tech. in Telecommunication Technology and Management

M.Tech. in VLSI Design Tools and Technology

Master of Science (Research):

- M.S. (R) in Applied Mechanics
- M.S. (R) in Bharti School of Telecommunication Technology and Management
- M.S. (R) in Biochemical Engineering and Biotechnology
- M.S. (R) in Chemical Engineering
- M.S. (R) in Civil Engineering
- M.S. (R) in Computer Science and Engineering
- M.S. (R) in Electrical Engineering
- M.S. (R) in Mechanical Engineering
- M.S. (R) in Amar Nath and Shashi Khosla School of Information Technology
- M.S. (R) in School of Biological Sciences

Masters of Business Administration (M.B.A.):

- M.B.A.
- M.B.A. (with focus on Telecommunication Systems Management)
- M.B.A. (with focus on Technology Management), (part-time evening programme)

Master of Design in Industrial Design (M.Des.)

Masters of Science (M.Sc.)

- M.Sc. in Chemistry
- M.Sc. in Mathematics
- M.Sc. in Physics

Postgraduate Diploma:

- D.I.I.T (Naval Construction) (for candidates sponsored by the Indian Navy)

Dual Degree: B.Tech. and M.Tech.:

B.Tech. & M.Tech. in Biochemical Engineering and Biotechnology

B.Tech. & M.Tech in Chemical Engineering

B.Tech. & M.Tech in Computer Science and Engineering

B.Tech. & M.Tech. in Mathematics and Computing

Bachelor of Technology (B.Tech.)

B.Tech. in Biochemical Engineering and Biotechnology

B.Tech. in Chemical Engineering

B.Tech. in Computer Science and Engineering

B.Tech. in Civil Engineering

B.Tech. in Electrical Engineering

B.Tech. in Electrical Engineering (Power and Automation)

B.Tech. in Mathematics and Computing

B.Tech. in Mechanical Engineering

B.Tech. in Production and Industrial Engineering

B.Tech. in Engineering Physics

B.Tech. in Textile Engineering

The details of these programmes are given under specific Departments, Centers and Schools in this Prospectus as well as in the Courses of Study 2016-2017.



3. ADMISSIONS

Admission to IIT Delhi is possible through various entrance examinations, like the Joint Entrance Examination (JEE), Graduate Aptitude Test in Engineering (GATE), Common Entrance Examination for Design (CEED), Common Admission Test (CAT) and Joint Admission Test in M.Sc. (JAM), for its various degrees and programmes.

3.1 UNDERGRADUATE PROGRAMMES

Admission to all Undergraduate Programmes listed in Chapter 2 are made through the Joint Entrance Examination (JEE) (Main and Advanced). For further information please visit JEE website: <http://jee.iitd.ac.in/>

Visiting Studentship

A student, who is registered for an Engineering /Technology degree in a recognized Institute /University in India or abroad, is eligible for being considered as a visiting student at IIT Delhi, for a maximum period of 6 months / one semester. More details can be obtained from the Undergraduate (UG) Section of the Institute.

Summer Research Fellowship

In order to expose students from other Engineering Colleges /Institutes to the ongoing research activities at IIT Delhi, Institute has introduced Summer Research Fellowship programme for undergraduate students from other engineering Institutes. IIT Delhi will offer fellowship or interns can also be supported from budget of sponsored / consultancy projects, through an outside fellowship (eg. KVPY, INSA, INAE, etc.) or institutional MoUs. Further details can be obtained from the Undergraduate (UG) Section of the Institute.

Admission of UG students to PG programmes with advance standing

UG students of IIT Delhi with advance standing are eligible for admission to PG programmes at IIT Delhi. Details are given in the Courses of Study booklet.

3.2 POSTGRADUATE PROGRAMMES

Procedure for admission: Applications are invited from candidates by advertising the programmes in the Employment News, leading Newspapers as well as on the Institute Website in March/October every year. Subsequently, the candidates have to apply online as specified in the advertisements.

Admission are done through the Graduate Aptitude Test in Engineering (GATE) for M.Tech. Programmes, Common Entrance Examination for Design (CEED) for M.Des., CAT for M.B.A. and, JAM for M.Sc. programmes.

Admission to Ph.D./M.S. (Research) programme is also possible any time during the year through Department Research Committee (DRC) / Centre's Research Committee (CRC) / Research Committee of School with the approval of Dean, Academics. For further information / details, please visit: **the institute website - www.iitd.ac.in**

IIT DELHI FOLLOWS RESERVATIONS IN ADMISSIONS (BOTH UG AND PG) AND CHARGES FEES AS PRESCRIBED BY GOVERNMENT OF INDIA FROM TIME TO TIME.

Migration from one PG Programme to another PG Programme of the Institute

Provision exists for the PG students of the Institute to move from (i) M.Tech./M.S. (R) to Ph.D., (ii) M.Tech. to M.S. (R), and (iii) M.S. (R) to M.Tech. The details of the provisions are available on the Institute website.

ADMISSION OF FOREIGN NATIONALS

- **Applicants under Cultural Exchange Fellowship Programme:** The foreign nationals desiring admission to a post-graduate programme (M.Sc./M.Des./M.Tech./M.S. (Research)/Ph.D.) at IIT Delhi under this Fellowship programme, are required to apply to the Indian High Commissions/Embassies, in their respective countries. After examining the case of the applicants, they will recommend / sponsor the names to the Indian Council for Cultural Relations (ICCR), New Delhi, which in turn, will recommend the applicants to this Institute.
- **Self-Financing Foreign Nationals:** Applications from foreign nationals for admission to the various postgraduate programmes (M.Sc./M.Tech./M.S. (Research)/M.Des./M.B.A./Ph.D.) at the Institute are received directly by the Institute. The desirous foreign nationals will submit their complete curriculum vitae with particulars of their academic qualifications etc. The details of such admissions are available on the Institute Website.
- **Students under Memorandum of Understanding:** Admission of foreign nationals to the various postgraduate programmes (M.Sc./M.Tech./M.S. (Research)/M.Des./M.B.A./Ph.D.) at the Institute will be made in accordance with the terms and conditions of the MoU agreed to between IIT Delhi and the Country/ University/ Institution concerned.

3.3 SCHOLARSHIPS

UNDERGRADUATE PROGRAMMES

Institute Merit-cum-Means (MCM) Scholarships

The Institute offers Merit-cum-Means scholarships to under-graduate students in engineering and technology. These scholarships are offered to about 25% of the students. The present value of Merit-cum-Means scholarship is ₹1000/- per month for General/OBC students and the recipient is exempted from paying tuition fee.

Institute Merit Prizes and Certificates

The Institute offers Merit prizes and Certificates to the top 7% of the students of each 4-year B.Tech., and 5-year Dual Degree programmes each semester up to the 8th / 10th Semester. The value of merit prize is ₹2500/-.

Institute Free Studentship-U.G.

The Institute offers free studentship to 10% of the students on the basis of means alone.

Scholarship provision for SC/ST students: Tuition fee exemption is admissible to all SC / ST students irrespective of their parents' / guardians' income, Institute offers several other benefits to students from these categories.

IIT Delhi Alumni Sponsored Scholarships-“Loan Scholarships”: IIT Delhi alumni sponsored “Loan Scholarship Scheme” makes it more affordable for students at IIT Delhi to take an educational loan from banks.

Donor Scholarships: There are several other scholarships in operation at the Institute. These scholarships have been established by grants from individuals, trusts and organizations.

SCHOLARSHIPS FOR POST GRADUATE PROGRAMMES

M.Sc. Programmes

Merit-cum-Means scholarship of ₹1000/- per month and tuition fee waiver are permissible to M.Sc. students to the extent of 25% of the sanctioned strength as per Institute rules. Only those students are eligible whose parents' gross income is less than ₹ 4.5 lac per annum for all categories of students / as per govt. orders as applicable .

M.Tech., M.S. (Research) and M.Des. Students: The Institute does not award any scholarship to the students of M.Tech., M.S. (Research), and M.Des. programmes. However, a scheme for financial assistance is in operation. Apart from the teaching / research assistantships, there are a number of fellowships and scholarships Instituted by industries and individuals for such students.

Ph.D. Students: Although the Institute does not award any scholarship, a scheme for the award of Teaching / Research Assistantship for providing financial assistance to the students exists, under this scheme, those students, who are admitted on full-time basis, are offered Teaching/Research Assistantship, provided they are not getting any other equivalent fellowship.

3.4 ADMISSION TO POST GRADUATE PROGRAMMES

Degree	Status	Minimum Eligibility for Admission	Selection basis
M.Sc.	Full Time	At least 55% aggregate marks(taking into account all subjects including languages and subsidiaries, all years combined) for General category candidates and at least 50% aggregate marks (taking into account all subjects, including languages and subsidiaries, all years combined) for SC /ST and PD category candidates in the qualifying degree. For Candidates with letter grades /CGPA (instead of percentage of marks), the equivalence in percentage of marks is decided by the Admitting Institute(s). For M.Sc. (Chemistry) Bachelor's degree with Chemistry as a subject for three years / six semesters and Mathematics at (10+2) level. For M.Sc. (Mathematics) Bachelor's degree with Mathematics as a subject for at least two years/four semesters. For M.Sc. (Physics) Bachelor's degree with Physics as a subject for three years / six semesters and Mathematics for at least one year/two semesters.	JAM
M.Tech.	Full Time	B.Tech. /M.Sc. or equivalent with a CGPA 6.75 on a 10 point scale or 60% marks in aggregate for General Category with (a) GATE score of 300 or qualifying score (b) GATE score of 200 or qualifying score whichever is higher for SC /ST /PD category. *B.Tech. from IITs with CGPA of 8.00 without GATE are also eligible for admission. AMIE / Grad. IETE are eligible, subject to condition at Note 7.	GATE and Written test and/or interview
	Full Time Direct Admission	B.Tech. /M.Sc. or equivalent with (a) CGPA of 8.5 or 75% marks in aggregate for General /OBC Category, and CGPA of 7.5 or 70% marks in aggregate for SC /ST /PD category. GATE Score > 300 or qualifying score whichever is higher for General /OBC and 200 or qualifying score whichever is higher for SC /ST /PD.	GATE and interview if required
	Part Time Evening Programme	B.Tech. /M.Sc. or equivalent in relevant field with (a) CGPA 6.75 on a 10 point scale or 60% marks in aggregate for general Category and minimum 1 year experience. Must submit No. Objection Certificate from employer (as per Note 4) Organisation should be located within 50km. of IIT Delhi. Also see Note. 6.	Written test and/or interview
	Sponsored PT /FT	Same as for M.Tech. part time requirements and Sponsoring Certificate from the employer as per Notes 4 and 5 respectively.	-Do-
M.Des.	Full Time	B.Tech. /M.Sc. or equivalent in relevant field with CGPA 6.75 on 10 point scale or 60% marks in aggregate for general /OBC category and CEED score>(a) 75 percentile for general category /OBC, or (b) 50 percentile for SC /ST /PD category.	Written Test and / or interview
M.B.A.	Full Time	Becholar's degree in Engineering /Technology /Architecture /Pharmacy /B.Sc. Agri.Engg. (Minimum 4 year after 10+2) or Master's degree in any branch of Physical /Chemical /Mathematical Sciences like Physics /Chemistry / Mathematics / Statistics / Computer Application / Electronics Sciences / Environmental Science or Computational / Information science /Agriculture OR Master degree in Commerce / Economics with CGPA of 6.75 on 10 point scale or 60% marks in aggregate for general category.	CAT and Group Discussion and / or interview
	Part Time (evening)	Same as M.B.A. full-time requirements and two-years experience.	Written test and interview

Degree	Status	Minimum Eligibility for Admission	Selection basis
M.S.	Full Time/ Part Time sponsored Full Time/ Part Time	Full Time / Same as the corresponding M.Tech. requirements.	Same as the corresponding M.Tech. requirements.
Ph.D.	Full Time	Master degree in Engineering /Technology or master degree in Science / Humanities or equivalent in relevant discipline with CGPA 6.75 on 10 point scale or 60% marks in aggregate for general /OBC category. Full time students who do not possess M.Tech. orequivalent degree are required to have a valid GATE Score (300 or qualifying score whichever is higher for GE/OBC & 200 or qualifying score whichever is higher for SC /ST /PD) or UGC /CSIR / DBT / ICMR / INSPIRE fellowship examination for Sciences / Humanitiesand Social Sciences disciplines. OR B.Tech. or equivalent with CGPA of 7.5 on a 10 point scale or 70% aggregate marks and qualified GATE or UGC /CSIR / DBT / ICMR / INSPIRE fellowship examination for Biomedical Engg., candidates having M.B.B.S. with 60% marks or more are eligible provided they have qualified ICMR. The Candidates having Postgraduate degree of doctor of medicine (MD) / Master in Surgery (MS) with 60% marks or more after MBBS will also be eligible for admission to Ph.D. Programme in CBME. In respect of M.A., M.Sc. and /or B.Techs. from IITs graduating with a CGPA of 8.0 or above, the requirement of qualification through a national examination. In respect of students from CFTIs (Centrally Funded Technical Institutions (IIT's, NIT's, IIIT's etc.) having CPI /CGPA 7.00 (at 10.00 scale) at the end of 3rd year, the requirement of qualification through a national examination is waived off.	Written test and / or interview
	Part Time	Same as for Ph.D. full time and minimum 2 years experience and No Objection from the employer	Written test and / or interview
	Sponsored Full Time or Part Time	Certificate from employer (as per Note 8.) No GATE required (Note.12)	-Do-
	Part Time Foreign National Posted in Delhi	Same as for full-time Subject to conditions stipulated in Note 13.	-Do-

NOTES:

- 15% seats are reserved for SC candidates, 7.5% for ST candidates and 27% for OBC (non-creamy layer) candidates.
- The minimum eligibility for SC, ST and PD candidates is a CGPA of 6.25 on a 10 point scale or 55% in aggregate marks. Relaxation in CGPA to 6.25 or in marks to 55% in the minimum qualifying criteria may be permitted to those general / OBC candidates who possess M.A. degree in English for admission to Ph.D. programme in English in the Department of Humanities & Social Sciences.

3. 3% of the seats allocated for full-time students, excluding sponsored students, students drawing assistantship from other sources and foreign students are reserved for Persons with Disability (PD) for admission to various Postgraduate Programmes. The candidates selected against the quota for PD be placed in the appropriate category viz. SC/ST/OBC/General Candidates depending upon the category to which they belong.
4. No Objection Certificate should state that the candidate is permitted to pursue studies on part time basis and he/she will not be transferred to any other place during the period of study.
5. Sponsorship letter (on letterhead of the sponsoring organization) should state that period of study will be treated as on duty with usual salary/allowances and he/she would be fully relieved and granted study leave for the period of studies.
6. For part-time M.Tech. in Energy & Environment Management Lectures are held on week days in the evening from 6.30 p.m. to 8.30 p.m. and laboratory classes are held on Saturdays and Sundays. For part-time MBA programme, the classes are held in the evening.
7. Candidates with AMIE/grad. IETE fulfilling the minimum eligibility criteria can be considered for admission as visiting students for completing 24 earned credits of undergraduate courses as prescribed by the respective programme after which they have to appear for GATE and apply afresh for admission to M.Tech. programme.
8. The letter should state that he/she is permitted to pursue studies on part time basis and that
 - (i) his/her official duties will permit sufficient time for research,
 - (ii) facilities for research are available at the place of work,
 - (iii) he/she will be permitted to reside at the Institute for at least 6 months* during his/her registration for the degree (not applicable if organization is within 50 km of IIT Delhi).

*If the course credit requirement recommended by a Deptt./Centre is more than 12, then the residency requirement for part time Ph.D. Candidates holding degrees from other Institutes / Universities and working in organisations outside Delhi will be 12 months.
9. Full-time applicants coming on study leave must show proof of at least 3 years (2 years in the case of M.Tech. degree holders) study leave when appearing for the interview.
10. CGPA is Cumulative Grade Point Average. For the purpose of admission at IIT Delhi, the following functional relationship shall be used to determine equivalent GPA on 10-point scale for % marks and vice-versa (upto 90% marks) will be used to convert percentage of marks into GPA.

$$G=0.75+(P/10) \quad \text{or} \quad P=10*(G-0.75)$$

where G is the GPA on 10 points scale and P is the % marks.

Using this formula, the conversions work out as follows :-

%	CGPA
50	5.75
55	6.25
60	6.75
70	7.75
75	8.25
80	8.75
90	9.75

For CGPA with scales of other points, a linear interpolation will be used i.e.

$$G = G_x * 10 / X$$

where G is the GPA on 10 points scale and G_x is the GPA on 'x' point scale. Conversions worked out using the above formula for some scales are given in the following table.

%	CGPA 10	CGPA 9	CGPA 6	CGPA 4
50	5.75	5.175	3.45	2.30
55	6.25	5.625	3.75	2.50
60	6.75	6.075	4.05	2.70
70	7.75	6.975	4.65	3.10
75	8.25	7.425	4.95	3.30
80	8.75	7.875	5.25	3.50
90	9.75	8.775	5.85	3.90

The minimum prescribed 60/55/50% marks in aggregate (of all the years/Semesters of the qualifying examinations) is calculated by IIT Delhi as per the following example:-

	1st semester	%	2nd semester	%
1st year	250/400	62.50	290/400	72.50
2nd year	205/400	51.25	280/400	70.00
3rd year	210/400	52.50	350/400	87.50
4th year	240/400	60.00	150/400	75.00
Total	905/1600		1070/1400	

- Aggregate (%) (of all the years/semesters) $1975 / 3000 = 65.83\%$

11. Sponsored (Full-time) / Part-time candidates are not required to possess GATE /CEED score for admission to postgraduate / Ph.D. programmes.
12. The registration of foreign nationals, posted in Delhi, to Ph.D. Programme on part-time basis can be made on the terms and conditions as under :-
 - (i) The admission will be subject to production of Research Visa for study at IIT Delhi.
 - (ii) The candidate should satisfy all the requirement as applicable to part-time scholars.
 - (iii) The candidate will be charged fees as applicable to foreign nationals.

3.5 MEDALS AND PRIZES

IIT Delhi also awards numerous medals and prizes to the students on the basis of examination / project and all-round performance in sports, co-curricular activities, etc. At present there are around eighty such medals and prizes in operation (a list of these is available on the Institute website).



4. FEES

The fees payable by 2016 entry year students are given in Table below

4.1 FEES PAYABLE BY STUDENTS OF THE ENTRY YEAR 2016

Tuition Fees		
Programme		Tuition Fee
B.Tech. Dual degree M.Tech.		₹ 1,00,000**
M.Sc.		₹ 2,500
M.Tech., M.S. (R) M.Des. (Receiving Institute / Project Assistantship or Teaching position holders)		₹ 5,000
M.Tech. / M.S.(R) / M.Des./DIIT (Sponsored, FT / PT & Non-Teaching position holders)		₹ 25,000
Ph.D.		₹ 2,500
M.B.A. Self-financing	Full Time	₹ 1,00,000
	Part Time	₹ 66,667
Foreign National	SAARC Countries	US\$ 1,000
	Non SAARC Countries	US\$ 2,000

Semester fee (to be paid every semester alongwith Tuition fee)

INSTITUTE FEES	
Examination fees	₹ 500
Registration/Enrolment fees	₹ 300
Gymkhana	₹ 500
Medical fees	₹ 100
Internet and computer access fee	₹ 500
Transport charges	₹ 100
Total	₹ 2,000
HOSTEL FEES	
Hostel seat rent	₹ 5,000
Amenity charges	₹ 300
Total	₹ 5,300

OTHER PAYMENTS	
Student Distress Fund Scheme	₹ 200
Insurance Scheme	₹ 500
Total	₹ 700

One Time payment to be paid at the time of admission

Non Refundable	
Admission fees	₹ 1,000
Student welfare fund	₹ 300
Modernization fees	₹ 500
Benevolent fund	₹ 200
Alumni fees	₹ 1,000
Training and Placement charges	₹ 500
Total	₹ 3,500
Refundable	
Institution security deposit	₹ 2,000
Library security deposit	₹ 2,000
Total fees payable at the time of admission	₹ 4,000

Total fee payable (with hostel) 15,500, without hostel 10,200.

NOTE :

#The tuition fee in 9th semesters and later will be ₹ 5,000/- per semester for Dual-degree programmes.

*Medical fee and transport fee is applicable to full time students only.

**1/3rd of tuition fee for student with family income between ₹ 1 lac to ₹ 5 lac per annum.

Thesis fee for M.S. (R) & Ph.D. is ₹ 500 and ₹ 1000 respectively and shall be payable at the time of submission of thesis.

All SC, ST, PD and students whose family income is < ₹ 1 lac per annum will get 100 % tuition fee exemption.

Hostels is available only to full time student.

Messing and electricity charges will be calculated on completion of each semester and will be notified separately.

4.2 FOREIGN NATIONAL STUDENTS (SELF-FINANCING)

Following are the fees per semester, chargeable from Self-Financing foreign National Students including those seeking admission as visiting students : 2016-2017

- i) US \$ 1,000 and ₹ 11,835 for SAARC Countries.
- ii) US \$ 2,000 and ₹ 11,835 for Other Countries.



4.3 MODE OF PAYMENT

(a) Institute dues:

All Institute dues are to be paid through State Bank of India Internet Banking only.

Payment by challan slip is allowed only to the following:

- (i) students who have taken loan from a bank (for educational purposes), or
- (ii) students who are holders of a scholarship from outside sources who directly send cheque(s) for fees in the name of the Institute, or
- (iii) new students who are joining the Institute for the first time.

(b) Mess dues: Mess dues are to be paid by demand draft at State Bank of India, IIT Delhi branch, into the account of the respective hostel. Maintaining an account with State Bank of India, IIT Delhi is mandatory. Every student should obtain the account ID and password from SBI, IIT Delhi branch. SBI, IIT Delhi is a Core Banking Branch. All assistantship and scholarship payments will be made directly into the student's account.

4.4 DEADLINES FOR PAYMENT

(a) Institute dues:

- (i) All Institute dues are to be paid in full before the last date for Late Registration (this is typically one week after the first day of classes)
- (ii) Students who do not pay the required amount by this date, or those who make partial payments, shall have their registration cancelled. Registration will be restored on payment of fees and a fine as stipulated in the Institute rules.
- (iii) In case of new entrants, the fees have to be paid by demand draft on the day of registration at the time of joining the Institute.

(b) Mess dues: All Mess dues are to be paid on or before the date for Registration Validation, i.e. before the first day of classes.

4.5 REFUND OF FEES

The whole amount of fees / other charges deposited by the students will be refundable after deduction of ₹ 1,000/, if the students do not join the programme after paying the dues and leave the Institute by applying for refund on or before the date of registration. No refund of fees will be permissible to students who have registered for the programme but leave immediately thereafter. In such cases, only caution money will be refunded.

5. STUDENT LIFE ON CAMPUS

The ambience of student life and activities on the campus is to provide an invigorating and creative environment which promotes independent thinking and introspection and leads the young students to become more aware of the consequence of their own actions.

Excellent facilities for accommodation to a large number of students, co-curricular activities, sports and games recreation, shopping, etc., are provided to the students on campus. Special efforts are also made to promote and strengthen student-teacher interaction. Students Counselling Service has been set up to assist and morally support students in their initial adjustment, and also to deal with any difficulties, they may have during their stay at the Institute.

5.1 HALLS OF RESIDENCE

There are eleven boys' hostels and two girls' hostels. The boys' hostels are Nilgiri, Karakoram, Aravali, Jwalamukhi, Satpura, Zanskar, Kumaon, Vindychal, Shivalik, Girnar and Udaigiri. Kailiash and Himadri Hostels are for girls. Each Hostel is self-contained with amenities such as a reading room, an indoor games room, a lounge and a dining hall with mess, a computer room and TV in common room. All rooms have been provided with Internet facilities.

5.2 STUDENT AFFAIRS COUNCIL (SAC)

The Student Affairs Council is a joint student-faculty Senate committee to deal with overall policy formulation, coordination and review of student affairs, which are of non-academic nature.

The SAC co-ordinates the activities of the various student organizations, viz., Boards for Recreational and Creative Activities, Sports, Hostel Management, Students Publications and Student Welfare. It also works to promote the student interests and endeavors to create healthy traditions in campus life.

5.3 CO-CURRICULAR AND ACADEMIC INTERACTION COUNCIL (CAIC)

The council is a joint committee of undergraduate students, postgraduate students and faculty that provides feedback to the Board of Undergraduate Studies on all academic and allied matters. By means of suitable dialogues with appropriate authorities, it also tries to solve local as well as general problems of students that are co-curricular and academic in nature.

5.4 CO-CURRICULAR ACTIVITIES

IIT Delhi provides a full measure of opportunity to its students for co-curricular pursuits. Through several students directed activities a student participates actively in the many-sided life of the Institute community. He/She pursues his/her intellectual and aesthetic horizons far beyond the realm of the classroom experience, and he/she expands his/her interests and forms new relationships.

5.5 THE STUDENTS' ACTIVITY CENTRE

The Students' Activity Centre is the nerve centre of all student activities on the Campus. With a moat on one side and a high stone wall on the other, the Students' Activity Centre recalls to the visitors memories of an ancient fort. The Centre comprising a Club Building, Gymnasium Hall, Swimming Pool, Amphitheater, Music Rooms, Robotics Room, and Hobbies Workshop, caters to various hobbies of the Students. They have a place to paint, to sculpt or to tinker with the radio.

There are committee rooms where they can hold formal or informal meetings and a large marble-floored hall for exhibitions. On the first floor of the Centre, students have facility to play billiards, table tennis etc.

5.6 STUDENTS' CANTEENS

There are canteens for the students in the Hostel area just opposite to Aravali Hostel, in Himadri Hostel and adjacent Kumaon Hostel and the others located in front of Library across the road. The Hostel area canteen is open normally from 4 p.m. till midnight. The other canteens run during the Institute working hours. Working of these canteens is looked after by the Canteen Cell of the Board of Hostel Management. There are Coffee and Cold drinks kiosks also in the Institute.

5.7 STATIONERY SHOP/TELEPHONE BOOTHS

For the benefit of the student community, there is a stationery shop situated in the academic area. A number of Xeroxing facilities and STD/ISD/PCO facilities are available in all the Hostels.

5.8 BOARD FOR RECREATIONAL AND CREATIVE ACTIVITIES (BRCA)

The Institute offers excellent opportunities to the students to participate in a wide range of recreational and creative activities, under different Clubs and Samities of BRCA under the leadership of elected Secretaries and representatives from different hostels. Students interested in drama, music, paintings or indoor games can join the Dance & Dramatics Club, Music Club, Fine Arts Club and Indoor Sport Club, respectively. Students who wish to pursue different hobbies can find creative expression for their interests in the Photography and Hobbies Society. The English Debating and Literary Club, Hindi Samiti and Quizzing Club offer ample opportunities for literary expression. The Film Series Committee organizes regular shows of feature films from different countries. SPIC-MACAY promotes Indian Classical Programmes in collaboration with its national body. The activities organized include inter-hostel and inter-college competitions as well as non-competitive events. An annual inter-college cultural festival "Rendezvous" is organized in the first semester to encourage interaction between IIT and various colleges and to promote competition of high standard. In the second semester, BRCA organizes cultural events during the student week along with a festival 'Virasat' organized by SPICMACAY. During this festival, professionals hold Lec-Dems in order to expose the students to various forms of Indian classical music, dance, drama and other arts and crafts.



Dance Club

With the philosophy "Love the art in yourself and not yourself in the art", the Dance Club is one of the most glamorous clubs in the BRCA. The audience participation in this club is overwhelming, and the Duo Dance and the Group Dance events are among the most eagerly awaited events of the year. The Institute Dance Production, organized towards the end of the year is the magnum opus of the club, and it also provides aspiring students a platform to improve their skills. V-Defyn, IIT Delhi's dance troupe, has grown into a professional group of dancers who have brought many laurels to the college in recent years.



Fine Arts and Crafts Club

FACC is the perfect platform for you to showcase your artistic capabilities and also learn a lot of new things at the same time. With events like Oil Painting, Charcoal Painting, Mask Painting and workshops on artistic activities like Origami, there is a lot to fulfil your creative appetite. The club also organizes various events such as Street Painting, Graffiti, Face Painting etc during Rendezvous. The FAC junta is renowned for its untiring efforts, and is one of the closest knit communities on campus. The club plans to have a permanent exhibition room at the Student Activities Centre from this year.



Hindi Samiti

A sad side effect of globalization is the diminishing importance for local languages, especially in urban areas like Delhi. It then becomes more and more important to hold onto one's culture. The Hindi Samiti celebrates all things Indian and then some. Indeed, most Hindi Samiti debates show remarkable maturity and brilliant thinking on the part of the participants. With other entertaining events like Sopan (the Indian Quiz), Word Games etc, the Hindi Samiti has made a special place for itself in IIT.

Debating Club

The Literary Club aims to take your imagination and creativity to a higher level. The Club organises a Reader's Circle to promote a reading culture among the students. To keep the fun quotient high, events like word Games (Scrabble), Pot Pourri, Cryptic Crosswords are planned. A trip to the famous Jaipur Literary Fest and other trips organized by Literary Club have been the most memorable literary adventures the club has seen.



One of the most respected clubs in IIT Delhi, the Debating Club has a long standing tradition of excellence. With events like Extempore, Parliamentary Debates, and MUNS, This club presents a plethora of opportunities for students. They also get to polish their communication skills, and gain self-confidence. The events are also known for their fun filled atmosphere. Though it may sound hard to believe, all you need to be a part of this club is a sincere interest.

Literary Club

Music Club



Photography and Films Club



Drama Club



Gone are the days when you heard the famous "drama mat kar" from Mom and Dad when you got a Little Light headed and started play-acting for fun. You now are at a place where the bigger a dramebaaz you are, the more you're appreciated. The Dramatics Club presents a bunch of amazing events round the year, from stage and street performances to mimes and comedy acts that entertain the junta thoroughly.

Know for uniting the music fraternity of IIT Delhi, the club promotes the music culture among the students and faculty alike, giving a stage to willing performers and a platform to beginners to cultivate their skills. It organises an array of events encompassing many genres, both Western and Eastern. Most of the events are organized at the Institute level with independent participation, while some events also comprise hostels and departments competing against each other. Events like 'Mehfil' combine ghazals, qawwalis and Indian folk into a seamless and unforgettable experience. Towards the end of the year, the club organizes a music festival called 'Malhaar', which is highly popular in the IIT fraternity.

PFC, or Photography and Film Club is one of the most integral and popular clubs of the BRCA. A heaven for the creative, the Film section of the club organises events like Movie Making, Trailer Making, Ad-film Making etc. This club also conducts various workshops and learning sessions on software like Adobe After-Effects, Premier-Pro, and Photoshop. As far as Photography is concerned, with events such as Poster Making, Photography and Graphics Designing and workshops on various photography and editing techniques, whether you have a knack for taking pics or you just want to explore this field, take out your cameras and get clicking!!

Quizzing Club



The traditional notion of a quizzer is a person without a social Life who mugs up fact books day in and out. IITD's Quizzing Club is here to dispel this crude ideology and make quizzing a social hobby. The wide variety of questions will ensure that your knowledge, howsoever outlandish, is respected. You will learn how to think laterally, and when everything fails, a guess might turn out to be good enough cause of agony for your competitors. This year, the Quizzing Club is going all out, not only to promote your passion, but also inculcate the same in case you are a newbie. For the rest of the time, teams will fight it out for the ultimate glory and history has been a frequent witness to quizzes going down the wire. Happy Quizzing!

SPIC MACAY



Society for the Promotion of Indian Classical Music and Culture amongst Youth or SPIC MACAY is a voluntary youth movement which promotes Indian Classical Music, Dance and other aspects of Indian culture. VIRASAT- the annual fest of SPIC-MACAY sprawls over 3 weeks and comprises of performances and workshops in arts and crafts, talk, theatre, films and yoga. Highly esteemed classical performers like Pt. Hariprasad Chaurasia, Ustad Amjad Ali Khan regularly perform during Virasat. As a BRCA club, SPIC MACAY organizes many workshops, concerts and events to keep the students in touch with their heritage.

5.9 BOARD FOR SPORTS ACTIVITIES (BSA)

Board for Sports Activities (BSA) is a constituent body of the Student Affairs Council and is responsible for the coordination of the various sports activities in the Institute. It ensures that adequate sports facilities are available to the community and provides a forum for the students and staff to discuss and formulate policy towards the betterment of sports activities in the campus.

A cricket field with four turf wickets, four flood-lit cricket practice pitches, flood-lit hockey and football grounds, three flood-lit volleyball and two basketball courts, eight flood-lit tennis courts (four synthetic and four clay courts), tennis practice wall, three squash courts, one badminton hall, two table tennis halls with synthetic flooring, one weight- lifting hall, Olympic size swimming pool, kid's pool, two multi-gyms, a flood-lit stadium with 400 meters athletics track, flood-lit jogging track and ancillary arrangements for all the games are available to the students. Construction of new multipurpose hall with facilities for badminton, table tennis and squash courts is under consideration. A team of sports officer, physical training instructors, ground staff and part-time coaches help the students in their pursuit to greater sporting performances.





The Institute lays considerable emphasis on student's participation in various outdoor and indoor games. The students take part in the Fresher's events conducted for incoming first year students, friendly- matches with the local colleges, inter- Hostel events, the annual IIT Delhi Inter- Collegiate event 'Sportech', the annual Inter-IIT Sports Meet and in sporting activities organized by Institutes outside Delhi.





5.10 BOARD FOR STUDENTS PUBLICATIONS (BSP)

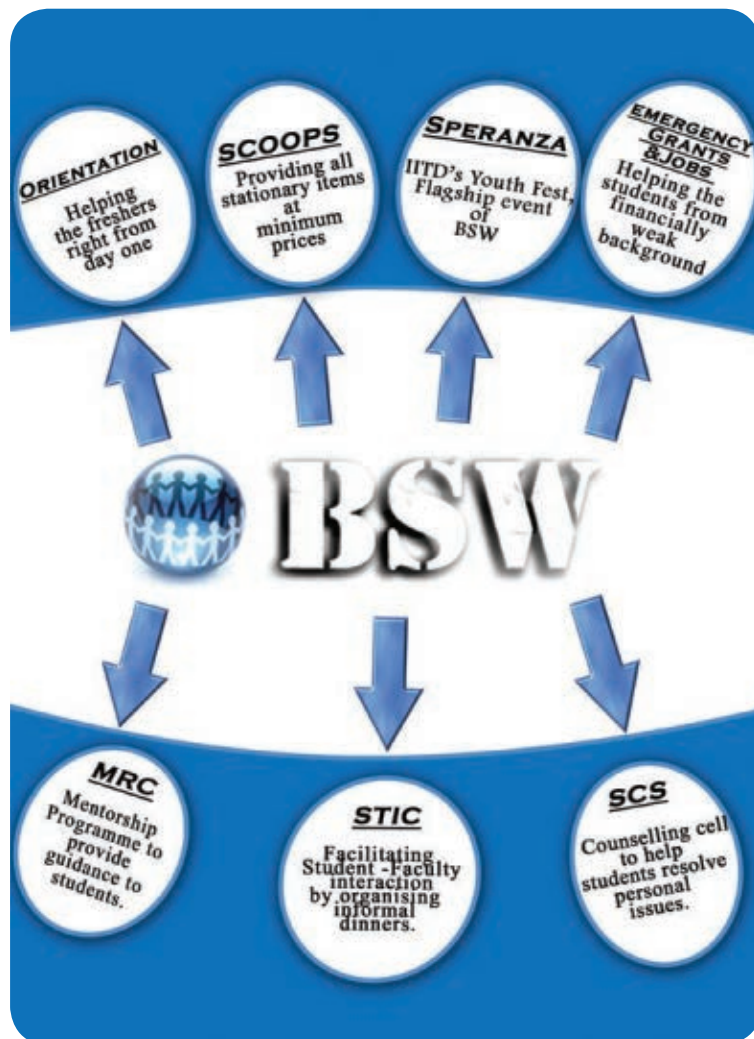
Board for Student Publications, a body managed almost entirely by the students, is involved in bringing out various publications and organizing events for nurturing the literary and journalistic talent of the student community. The Boards' annual campus magazine, *Muse* provides an excellent forum for expression of the creative skills of young minds on campus. The board's biannual technical publication, *Sync* is a technical compendium of all ongoing research activities at this premier institute of technology as well as around the world.

Apart from its creative publications, the board's key area of focus remains its journalistic activities and monthly newsletter *Insight*. With interviews and surveys pertaining to issues relevant to the IIT community, the board with its determined team of journalists keeps track of all ongoing activities on Campus and provides an interactive forum and information source through its social media presence and recently launched Website.

The Board also organizes an annual festival – *Literati* which is recognized and appreciated as one of the best literary college festivals in North India. With regular workshops and competitive events, during the festival as well as through the year, the board aims at developing and honing the creative and media skills of the student community.

5.11 BOARD FOR STUDENTS WELFARE (BSW)

The Board for Students Welfare, IIT Delhi is a student body set up with an intention to look after the welfare of the student community. The BSW has always been dedicated towards helping the student community in every aspect of life in IIT Delhi. The board adheres to a principle of making itself an organisation of the students, for the students, by the students. The constituent bodies of BSW have three permanent committees viz., Finance committee, Public Relationship committee and Mentorship committee.



Financial Committee is responsible to take care of all issues pertaining to financial aid, its payment and its recovery. It assists the deserving and bona fide student in securing summer/winter jobs during vacations as well as part-time jobs. It looks after loans, scholarships and grants which are provided by BSW to the needy and the deserving students.

Public Relationship Committee handles all aspects of the Board related to welfare activities, publicity and grievance-redressal. It is directly responsible to come up with new schemes from time to time in the benefit of the student community.

Mentorship Committee (MRC) monitors the student mentorship committee which intends to help the freshers in IIT to make informed decisions and grow positively when facing the college life for the first time. Every fresher is assigned a mentor and the mentor is evaluated and monitored to see to it that life in IIT for freshers is smooth and constructive.

BSW also runs a student cooperative society (SCOOPS) which runs on a no profit-loss philosophy. Located near Block I, its duty is to

provide students access to buy good-quality subsidised stationary items, note books and related services.

BSW organises the very popular, socio-welfare youth fest of IIT Delhi, Speranza. Each year Speranza welcomes huge crowd of students with great enthusiasm and is the first college fest to be organized in a new academic year. From MUN, workshops, talk shows to fun games and competitive events, Speranza has a wide spectrum of events taking place making them few of the most memorable days of IITD life.

Student Teacher Interaction (STIC) is another welfare activity carried on by BSW, to strengthen the student-teacher bond, the foundation pillar of any educational institution.

Student Counselling Service (SCS) under BSW provides a confidential environment where a student can explore and express aspects of one's self that may be painful or uncomfortable. Counsellor helps the students in gaining their own insights, and making and acting on their own choices, thereby enabling them to resolve the issues.

5.12 NATIONAL SERVICE SCHEME (NSS)

Launched in the Mahatma Gandhi Birth Centenary year 1969, as a student youth service programme, National Service Scheme (NSS) aims at arousing social consciousness of the youth with an overall objective of personality development of students through community service. The motto of NSS is "NOT ME, BUT YOU".

5.13 NATIONAL CADET CORPS (NCC)

The National Cadet Corps is an organization aiming at the development of leadership, character, comradeship, spirit of sportsmanship and the ideal of service, among the youth in educational institutions. The motto of NCC is "Unity and Discipline".

5.14 NATIONAL SPORTS ORGANIZATION (NSO)

The National Sports organisation is a classification in the scheme of education formulated in furtherance of setting a climate of sports consciousness and improvement of physique among the youth during their period of education. Sports is included in the curriculum at IITD.

5.15 STUDENT COUNSELING SERVICE (SCS)

The Student Counseling Service under the aegis of Board for Student Welfare at the Institute aims at assisting students in sorting out their difficulties and dilemmas in an environment where they can talk freely in confidence about any matter which is troubling them. Students seek counseling for a variety of reasons, such as difficulties in adjusting to campus life, problems in relationship, being shy, feeling lonely, anxious, depressed, confused, demotivated, low self-esteem, difficulties in coping with academic pressures and competition, worries about the future and low self-confidence.



5.16 DEPARTMENTAL PROFESSIONAL SOCIETIES

Most of the Departments / Centres / Schools have professional societies managed by the faculty and students to promote academic and professional interests. These societies also facilitate student-teacher interaction outside the classroom.



5.17 MEDICAL FACILITIES

The institute has a computerized hospital centrally situated in the campus, headed by the Head, Hospital Services. The institute has 9 doctors (Modern Medicine) one Homoeopathic physician and one Dental doctor. The Hospital is also visited by part-time specialists from All India Institute of Medical Sciences in the fields of Orthopedics, ENT, Ophthalmology, and Skin disease, Radio Diagnosis, Psychiatry, Endocrinology, Cardiology and Neurology. It provides facilities for OPD and limited In-patient treatment. The Hospital is well equipped to take care of primary emergencies. It has a Dental unit, well stocked pharmacy (Allopathic and Homoeopathic), a pathology lab, providing facilities for blood, urine, stool and biochemical testing.

5.18 STUDENT-TEACHER INTERACTION

The Institute encourages students to come in close contact with teacher. The Student-Teachers Interaction Committee (STIC) facilitates and promotes contact between teachers and students.

STUDENT-TEACHER INTERACTION COMMITTEE (STIC)

STIC encourages healthy and informal interaction of students with their teachers outside the boundaries of classrooms environment. Teacher can take their students to trip, for get-together and can have informal interaction. Dinners are organized in the hostel every semester where students can invite their teachers in their hostels. STIC also organizes dinners exclusively for all freshers with their teachers who were teaching in 1st semester of academic year and also with their teachers of the department. Departmental professional societies are encouraged to organize informal activities in their departments and STIC Partially supports monetarily.

CLASS COMMITTEES AND COURSE COMMITTEES

In order to bring about greater contact between students and teachers, Course Committees and Class Committees are constituted, comprising of both, students and faculty. These committees discuss academic matters relating to the course or class concerned.



STUDENT ADVISORS

A student advisor is appointed by the Department for a group of 10-12 students in the B.Tech., and dual-degree (B.Tech. and M.Tech.) programmes. Student are encouraged to keep in constant touch with his/her adviser regarding all academic affairs. The advisor, in turn, will provide the student with suitable advice regarding courses, academic load, and rules and regulations, etc. governing his/her academic programme. Student's registration each semester is carried out through the office of his/her advisor. The student advisor is also expected to keep in touch with the student's general performance and welfare both formally, as well as through informal channels.

PROGRAMME COORDINATORS

The administration of all postgraduate programmes is facilitated by a faculty member designated as the Programme Coordinator. The Programme Coordinator helps students regarding all registration and course related matters.

5.19 ALUMNI ASSOCIATION

IIT Delhi Alumni Association: Enriching lives of IIT Delhi Alumni, giving back to IITD and Nation Building Initiatives!

IITD Alumni Association is dedicated to bringing together the alumni community on a common platform to build another channel of personal and professional support to members through 'self-help' within community. IIT Delhi Alumni Association today has a membership of over 43,000 graduates from our alma mater and is growing at about 1,700 members a year. It is one of the most active alumni associations and operates through a network of national and international chapters. Our alumni are spread world over and figure amongst who's who worldwide.



Apart from serving as a base for information about the alumni, it initiates programs and organizes events important to alumni, their alma mater, and in the national interest.

Key IITDAA initiatives :-

- To promote and foster mutually beneficial interaction between the Alumni and the present students of IIT Delhi, and between Alumni themselves.
- To encourage the Alumni to take an active and abiding interest in the work and progress of the Institute so as to contribute towards the enhancement of the social utility of their Alma Mater.
- Alumni Award for Academic Improvement for students .
- Alumni Award for Community Service for students.
- Alumni Award for Research & Innovation for students.
- Award for “Outstanding Contribution to National Development” to recognize contributions made by IIT Delhi alumni in various facets of national development.

CHAPTERS OF IITD ALUMNI ASSOCIATION IN INDIA/ABROAD

Chapters India

- Ahmedabad : Sunil Parekh; Mob: 9825030828; E-mail : srparekh@gmail.com
- Bangalore : Mr. Naresh Kumar Agarwal; Mob: 09663379049; E-mail : naresh.agarwal@gmail.com
- Chandigarh : Mr. Brij Mohan Gulati; (R) 0172-2703197, Mob: 9815094002; E-mail : jdgulati@glide.net.in
- Chennai : President : JRK Rao (1978, Chemical, Kara); E-mail : jrk@whatarage.com
Vice President : Alok Bhatia (1983, Chemical, Kara); E-mail : alokbhatia3@gmail.com
Secretary : Vikash Goyal (2004, MBA, Jwala); E-mail : vikash.pallavi@gmail.com
Treasurer : Umesh Dhingra (1985, Civil, Jwala); E-mail : umesh@askyourdronline.com
- Dehradun : Mr. Rajesh Agarwal; Mob: 9412993352; E-mail : rajeshubha@hotmail.com
- Hyderabad : Mr. Sanjay Gadhalay; Mob: 9849454569; E-mail : sgadhalay@gmail.com
- Kolkata : Mr. Biplab Shankar Bose; (R) 03323373522, Mob: 9830071282; E-mail: bipira_bose02@yahoo.co.in
Ms. Anjali Saxena; M: 9836287182; Email: anj_goy@yahoo.co.in
- Madhya Pradesh : Mr. S.K. Mohanty; (O) 731-2488482/3/4; E-mail : smohanty@cat.ernet.in
- Jaipur : President : Mr. Sudhir Bansal; Mob: 9829019770; E-mail : sudhir@dil.in
Secretary : Mr. Chintan Bakshi; E-mail : chintan@startupoasis.in
Treasurer : Mr. Yogesh Soni; Mob: 9352556138; E-mail : sonisoniyogesh@gmail.com
- Mumbai : Mr. Sandip Bhatia; Mob : 72080-04490; E-mail : sandip.bhatia@gmail.com
Mr. Narinder K. Madan; Mob : 9004040388; E-mail : narinder_madan@hotmail.com
Mr. Gaurav Goyal; Mob : 9930949835; E-mail : gauravgoyal.iitd@gmail.com

NCR East : Mr. Yogesh Andlay; Mob: 9810292741; E-mail : yogesh@iitdalumni.com
NCR South : President : Mr. Ramakant Gupta; Mob : +91-9871775613; E-mail : rkguptausha@gmail.com
Secretary : Mr. Pramod Sahu; Mob : +91-9868503771; E-mail : pramod.sahu@hotmail.com

Chapters Abroad

Australia : Dr. Nalin Sharda; Email : NalinSharda@gmail.com; Residential Address : 112 Australia Drive, Taylors lakes, Victoria
Singapore : Mr. Venke Char; Email : Venke@3Thirdeye.com
UAE : Mr. Sunil Jain; Email : mrsuniljain@gmail.com
US : Susan Verghese ; Email: susan.verghese@yahoo.com
Sanjiv Goel; Email : sanjiv.g@droisys.com; Residential Address : Droisys, Inc. 4800 Patrick Henry Dr Santa Clara, CA 95054
UK : Amit Sharma; Email : Amit.Sharma@macquarie.com

5.20 CONDUCT AND DISCIPLINE

A student shall conform to a high standard of discipline and shall conduct himself, within and outside the precincts of the Institute, in a manner befitting the students of an Institution of national importance. He/she shall have the seriousness of purpose and shall in every way, train himself to lead a life of earnest endeavor and co-operation. He/she must follow strict ethical standards. Under no circumstances he/she will adopt unfair means for completing any component of evaluation in a course. He shall show due courtesy and consideration to the employees of the Institute and Halls of Residence, good neighborliness to his fellow students, respect to the Wardens of the Halls of Residence and the teachers of the Institute and pay due attention and courtesy to visitors.

5.21 HONOUR CODE

In order to promote ethical behaviour, the Institute requires every student to agree to abide by the Honour Code. At the time of admission, every student has to sign the Honour Code and submit a copy to the respective academic section. Violations of this Code are taken very seriously and may result in suspension or expulsion. The Honour Code is given on the inside back cover of this document.

5.22 INSTITUTE POLICY ON RAGGING

Ragging is banned in the Institute. If a student is found to have indulged in ragging in the past, or if it is noticed later that he/she has indulged in ragging, then he/she may be expelled from the Institute.

5.23 POLICY AGAINST SEXUAL HARASSMENT

Institute has a policy against sexual harassment and is committed to providing an environment free from sexual harassment of women at the workplace.

DEPARTMENT OF

APPLIED
MECHANICS





Puneet Mahajan, Ph.D. (Montana State Univ.)

Professor

Homogenization and Mechanical Properties of Composites, Low and High Velocity Impact of Composites, Precision Glass Moulding, Helmets, Snow Mechanics, Finite Element Applications.

Head of the Department



Suhail Ahmed, Ph.D. (IIT Delhi)

Professor

Structural Dynamics, Off-shore Structures, Reliability Engineering, Computational Mechanics, Low and high velocity impact, Composites, Probabilistic Mechanics, Finite Element Applications.

Jayant Jain, Ph.D. (Univ. British Columbia)

Assistant Professor

Mechanical behavior materials, texture anisotropy, Microstructure property correlation, alloy design, phase transformation



Murali R. Cholehari, Ph.D (IISc., Bangalore)

Assistant Professor

Turbulent Flows, Optical Flow Measurement, Applied Fluid Mechanics.

Santosh Kapuria, Ph.D. (IIT Delhi)

Professor

Smart Composite and Sandwich Structure, Structures Health Monitoring, Active Vibration Control, Functionally grade and Structures, Elasticity.



Anupam Dewan, Ph.D. (IISc., Bangalore)

Professor

CFD, Modeling and Heat Transfer, Modeling of Engineering Turbulent Flows, Heat Transfer Enhancements.

Ajeet Kumar, Ph.D. (Cornell Univ.)

Assistant Professor

Theory of rods, plates and shells, Crystal elasticity, Computational materials science, Multi-objective optimization Nano-mechanics, Numerical Analysis.



Nitya Nand Gosvami, Ph. D. (NUS, Singapore)

Assistant Professor

Intermolecular and Surface Forces, Atomic Scale Origins of Friction and Wear, Nanotribology of Engineering Materials and Industrial Lubricant Additives, Nanoscale In Situ Methods In Tribology, Surface Modification and Molecular Self-Assembly Processes, Development of Novel Scanning Probe Microscopy Techniques, Nanoscience and Nanotechnology.

Suresh Neelakantan, Ph.D. (TU Delft)

Assistant Professor

Mechanical behavior of advanced materials: bulk and porous forms, *in situ* phase transformation effect on deformation behavior and structure-property correlations of materials and materials characterization. Current interest in Titanium alloys, TRIP steels & Ti-, Ni- and Fe- based: shape memory alloys, stochastic fibre networks and auxetic (i.e. negative Poisson's ratio) materials/composites and Bio-materials.



Sriram Hegde, Ph.D. (IIT Delhi)

Senior Systems Programmer/Manager

System Programming, Finite Element Analysis, FE Mesh Generation, CAD and CAM, Heat Transfer.

B.P. Patel, Ph.D. (MNNIT, Allahabad)

Professor

Nonlinear Static/Dynamic analysis of Shells. Composite Structures, Functionally Graded Structures, Bimodular Composite Structures, Continuum Damage Mechanics, Multiscale Modelling of Nano-Structures.





Pradyumna S., Ph.D. (IIT Kharagpur)

Assistant Professor

Functionally Graded Materials, Structural Dynamics, Stability, Composite Structures, Smart Structures, Plates and Shells.



Anamika Prasad, Ph.D. (MIT)

Assistant Professor

Cardio-vascular bio-mechanics, nano-indentation Finite Element Methods Nano-mechanics, Numerical Analysis.



Rajesh Prasad, Ph.D. (Cambridge Univ.)

Professor

Physical metallurgy, metal foams, nanocomposites, friction stir welding.



Sitikantha Roy, Ph.D. (Utah State Univ.)

Assistant Professor

Soft materials, mechanobiology, structural mechanics.



Sanjeev Sanghi, Ph.D. (City Univ.)

Professor

Numerical and Analytical Studies of Turbulent Flows, Chaos and Dynamical Systems, Computational Fluid Dynamics, Educational Software.



Arjun Sharma, Ph.D. (Stanford)

Assistant Professor

Compressible flows, acoustics and numerical simulations.

S.N. Singh, Ph. D. (IIT Delhi)

Professor

Fluid Mechanics, Internal and External Flows, Computational Fluid Dynamics, Two – phase Flows, Flow Instrumentation, Wind Energy.



M.K. Singha, Ph.D. (IIT Kharagpur)

Associate Professor

Finite Element Modeling of Composite, Sandwich and FGM structures, Stability and Nonlinear Dynamics of Plates and Shells under aero-thermo-mechanical loads, High Strain Rate Behavior of Materials, Impact mechanics.



Sawan Suman, Ph.D. (Texas A & M)

Assistant Professor

Turbulence Theory and Modeling, Hypersonic flows, Bridging method of turbulence, Boltzmann equation-based solvers.



Balaji Srinivasan, Ph.D. (Stanford)

Associate Professor

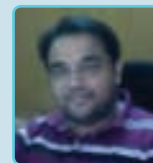
Computational and Theoretical Fluid Mechanics, Numerical Analysis, Turbulent Flows.



Vikrant Tiwari, Ph.D. (South Carolina Univ.)

Assistant Professor

Digital Image Correlation, Impact Mechanics, Dynamic Fracture Mechanics, Product Design & Analysis, Fuel Cells.



S.V. Veeravalli, Ph.D. (Cornell Univ.)

Professor

Experimental Investigation of Turbulent Flows, Stability Theory, Design Method for Sustainable Development.





Arghya Samanta, *Ph.D. (UPMC, France)*
Visiting Faculty
Fluid Mechanics.



Lt. Cdr. Arun E., *M.Tech. (IIT Bombay)*
Adjunct Faculty
Naval Architecture, Structural Design of Warships,
Materials for Marine Vehicles.



Lt. Cdr. K. Vignesh Kumar, *M.Tech. (IIT Kharagpur)*
Adjunct Faculty
Naval Architecture, Marine Hydrodynamics, Ship
Resistance & Propulsion.

Lt. Cdr. Ishaq S. Makkar, *M.Tech. (IIT Kharagpur),
DIIT (IIT Delhi)*
Adjunct Faculty
Submarine Hydrodynamics, Submarine Design,
Computational Fluid Dynamics (CFD),
Underwater Technology.



Cdr. M.P. Mathew, *M.Tech. (IIT Kharagpur),
DIIT (IITD)*
Adjunct Faculty
Naval Architecture, Warship Design,
Ocean Engineering.



D.K. Sehgal, *Ph.D. (IIT Delhi)*
Professor (Emeritus)
Numerical and Experimental Stress Analysis,
Finite Element Methods in Solid Mechanics,
Optimum Shape Design.



INTRODUCTION

The Departmental activities in teaching and research can be broadly classified under the headings of Solid Mechanics, Fluid Mechanics, Materials Science and Design Engineering.

ACADEMIC PROGRAMMES

UNDERGRADUATE

The Department offers basic courses in Mechanics, Experimental Methods and Analysis, Design Engineering, and Materials Science that are part of the undergraduate core curriculum. Students can also obtain minor degree in Applied Mechanics with specialization in Computational Mechanics. Faculties are also involved in guiding undergraduate students of various programs in their mini and major projects.

POSTGRADUATE

The Department offers Masters of Technology programmes with two specializations – (i) Engineering Mechanics, and (ii) Design Engineering. Students admitted to the M.Tech programme in Engineering Mechanics can opt for specialization in either (a) Stress Analysis (b) Fluid Engineering. A masters of Science (Research) programme is also offered with specialization in Applied Mechanics. A Postgraduate Diploma course in Naval Construction is also offered, in collaboration with the Indian Navy, to officers sponsored by Indian Navy. The course is of one and a half years duration.

RESEARCH AREAS

The Department has been involved in the following broad areas of research:

- Elasticity, Plasticity, Large Deformations, Manufacturing Analysis, Impact and Crash worthiness, Composite Materials, Composite Plates and Shells, Off-shore Structures, Smart Structures, Snow Mechanics, Computational Methods for Stress Analysis and Structures, Structural Optimization, Finite Element Method, Seismic analysis of Tall structures, Parallel Computing, Non-linear Dynamics and Chaos, Stability and bifurcation theory, Nano- mechanics, Bio-mechanics, Impact mechanics, Continuum Damage mechanics, Probabilistic Mechanics.
- Pipeline Engineering including Slurry transportation, Hydrodynamic Stability Theory and Turbulence, Low Dimensional Modelling, Computational Fluid Dynamics; Compressible flows; Industrial Aerodynamics and Pollution Dispersion, wind effects on structures, Flow through Turbomachinery Components like Diffusers, Impellers, Combustors etc., Internal and External Flows, Hypersonic Flows.

- Computer Aided Design, Design Engineering, Reliability Engineering, Availability and Maintainability Engineering.
- Elasto-Plastic Fracture Mechanics, Kinetics of Fatigue Crack Growth, Microstructure and Fracture Toughness, Failure Analysis and Residual Life Estimation, Strength and Deformation Behavior of Alloys, Thermo-mechanical Methods, Computational Materials Science.

Besides, the Department also organizes seminars, symposia, short-term courses and advanced summer schools for faculty of engineering institutes and engineers from industry. It also undertakes industrial consultancy work and has in hand both short and long-term projects sponsored by the government agencies and private industrial organizations.

Doctoral research is currently being carried out in the following areas:

Large Deformations, Impact Mechanics, Plasticity, Analysis of Manufacturing Processes, Composite Materials, Composite Plates and Shells, Non-linear Dynamics and Chaos, Off-shore Structures, Smart Structures, Snow Mechanics, Stress analysis and finite element application, Damage mechanics, Railway vehicle dynamics, Computational Methods for Fluid Flows, Pollution dispersion, Flow through Fluid Machines, Pipeline Engineering, Wind Engineering, Hydrodynamic Stability, Transition, Turbulence, Bio-fluid Dynamics. Computer Aided Design, Design Engineering, Reliability Engineering, Availability and Maintainability Engineering. Physical and Mechanical Metallurgy, metal foams, nanocomposites, friction stir welding, pattern formation in granular materials, Fracture Mechanics, Fatigue Crack Propagation, Environmental Cracking, Failure analysis and Mechanical Properties of Solids, Nano-mechanics, Dynamic flow conditions on Warship Helicopter decks etc.

LABORATORY FACILITIES

The Department has well-equipped laboratories, workshop and library facilities. The laboratories and their major facilities are as follows:

Computation Laboratory: Graphics Workstations with engineering software such as ANSYS, ABAQUS, COMSOL

High performance computing facility: 48 node cluster with each node housing dual quad-core AMD 2376 processor.

Design Optimization Laboratory: Workstations, Dual Processor –Softwares such as IDEAs, ABAQUAS, FLUENT, MATLAB, MATHCAD, Ship design tools - NAPA, PARAMARINE.

Fluid Mechanics Laboratory: Pilot plant test loop for slurry transportation, pilot plant for flow rate measurement up to 8 cusecs, Bohlin viscometer, Weissenberg Rheogoniometer.

Gas Dynamics Laboratory: Industrial wind tunnel (1.6m x 1.6m x 10m test section closed loop), Environmental wind tunnel (2mx 2mx10m suction type; is currently being renovated and may qualify for a central facility to be used by Civil Engg. Dept., Mechanical Engg. Dept. and Atmospheric Sciences) and low turbulence wind tunnels, Wide angle diffuser rigs. Instruments: PIV (2D/3D), LDV, Hot wire Ancomometry, Pressure and Strain Scanners.

Impact Mechanics Laboratory: Split Hopkinson Bar apparatus (tension and compression), High velocity projectile launch system, Dynamic three point bend test facility, Ultra high speed cameras, High speed data acq. System.

Materials Science & Physical Metallurgy Laboratory: Rolling mill, Wire drawing bench, Environment controlled heat treatment furnaces (programmable), Vickers and Rockwell hardness testers. Neophot -30 and Carl Zeiss microscopes with camera, Image Analyzer.

Materials Characterization Lab: Optical microscope, Hitachi TM3000 scanning electron microscope (SEM) with Bruker energy dispersive spectroscopy (EDS), Spectroscopic Alloy Analyzer, Shimadzu Micro hardness tester, Buelher automet polisher, Duel polishing machine.

Materials Science UG Teaching Lab: Models of crystal structure and defects, Microscope, Tensometer, Creep set up, Electrical sensitivity measurement, Band gap measurement.

MTS Laboratory: 250 kN MTS machine with facilities for mechanical testing, fracture mechanics testing and fatigue testing.



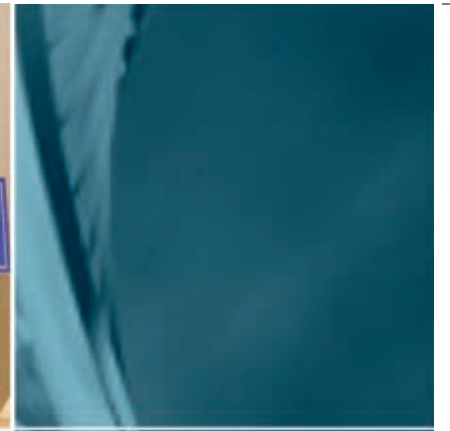
Strength of Materials Laboratory: 25 T Computerized Universal Testing machine (Zwick), 50 T Instron m/c, 10T and 100 T hydraulically operated Universal Testing m/c, Avery machines for hardness, impact, torsion and fatigue testing, Drop hammer facility (Instron 9250 HV) modified for Helmets.

Biomechanics/Soft Material Lab: 5kN UTM, AFM, Inverted Microscope Optical Bench, Sample preparation facility.

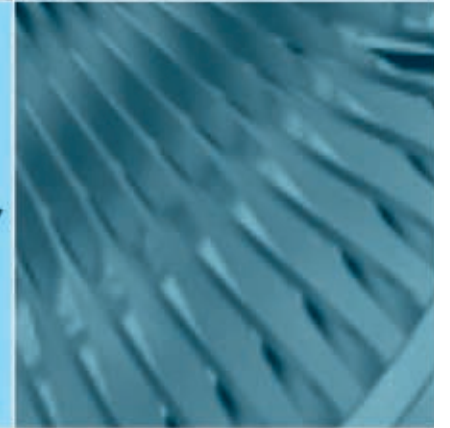
Stress Analysis Laboratory: Photo-elastic bench, Moiré fringe equipment, Digital strain meters, Super data loggers, Stress freezing ovens, etc.

Workshop: The departmental workshop has a number of machines that include Lathe machines, vertical milling machines, shaping machine, drilling machines, bench grinders, high temperature furnace, welding sets etc.





DEPARTMENT OF
BIOCHEMICAL
ENGINEERING
AND
BIOTECHNOLOGY





Prashant Mishra, Ph.D. (JNU)

Professor

Enzyme Science and Engineering,
Pharmaceutical Proteins, Bio-Nano-
Technology, Drug delivery.

Head of the Department



G.P. Agarwal, Ph.D. (Rice Univ.)

Professor

Bioprocess Engineering, Membrane
Based Protein Separation, Bioinformatics,
Membranes for Heavy Metal Ions Removal
and Waste Treatment.

Ritu Kulshreshtha, Ph.D. (Delhi Univ.)

Assistant Professor

RNAi Technology, MicroRNAs in Cancer Biology,
Cancer/Disease Biomarkers, Hypoxia Research.



**Misra Ashish, Ph.D. (Rutgers The State
University of New Jersey, New Brunswick)**

Assistant Professor

Metabolic Analysis and Engineering; Clinical
Diagnostics; Bioprocessing.

Saroj Mishra, Ph.D. (New York City Univ.)

Professor

Molecular Enzymology and Applications of
Hydrolytic Enzymes, Yeast Expression Systems,
Enzyme Mediated Bioremediation.



Shaikh Ziauddin Ahammad, Ph.D. (IIT Delhi)

Assistant Professor

Wastewater Treatment -Physico-chemical and
Biological, Anaerobic Wastewater Treatment.

Atul Narang, Ph.D. (Purdue Univ.)

Professor

Systems Biology of Microbial Gene Regulation.



V.S. Bisaria, Ph.D. (IIT Delhi)

Professor

Bioprocess technology; Metabolic regulation
and engineering; Bioconversions; Plant cell
biotechnology.

Sunil Nath, Dr. Ing. (Braunschweig Univ.)

Professor

Bioseparation, Mechanism and
Thermodynamics of ATP-based Molecular
Machines, Molecular Systems Biology/
Engineering



Ravikrishnan Elangovan, Ph.D. (Florence Univ.)

Assistant Professor

Single Molecule Biophysics, Fluorescence
Spectroscopy, Molecular Motors, Skeletal Muscle
Mechanics.

P.K. Roychoudhury, Ph.D. (IIT Delhi)

Professor

Bioprocess Engineering, Cell Culture
Engineering.

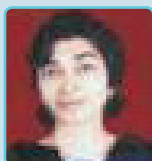




Shilpi Sharma, Ph.D. (L M Univ.)
Associate Professor
Functional microbial ecology in terrestrial and waste water treatment systems.



T.R. Sreekrishnan, Ph.D. (IIT Delhi)
Professor
Waste Engineering, Environmental Biotechnology.



Preeti Srivastava, Ph.D. (IIT Delhi)
Assistant Professor
Microbial Genetics.



A.K. Srivastava, Ph.D. (McGill Univ.)
Professor
Biochemical Engineering, Modelling, Optimisation and Control of Bioprocesses, Plant Cell Biotechnology.

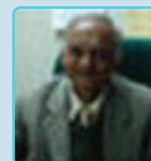
D. Sundar, Ph.D. (Pondicherry Univ.)
Associate Professor
Bioinformatics and Computational Biology, Protein-DNA recognition, Metabolic Engineering.



Subhash Chand, Ph.D. (IIT Delhi)
Emeritus Professor
Bioprocess Engineering, Enzyme Science & Engineering, Biosensors, Environmental Biotechnology.



Gupta M.N., Ph.D. (IISc., Bangalore)
Emeritus Professor
Chemical modification and chemical crosslinking of proteins; Production and Separation of Proteins/Enzymes.



INTRODUCTION

The Department offers a unique blend of scientific expertise in applied biological sciences, chemical and biochemical engineering. It strives for application of this expertise to evolve various biotechnological products, processes and services through:

- Generation of highly trained human resource capable of quantitative analysis of biological systems to facilitate their role in manning modern bioprocess industries and provide an integrated approach to research and development in biotechnology.
- Evolving research and development programmes to develop products and provide services in bio energy, environment and therapeutics.
- Leading global innovations in Bioprocess Technology and Applied Biological Sciences, and facilitate participation in industrial consulting and sponsored research.
- Dissemination of knowledge generated through short term courses, workshops and conferences.

ACADEMIC PROGRAMMES

UNDERGRADUATE

The Department offers a four year B.Tech. Programme and a five year Dual Degree Programme in Biochemical Engineering & Bio-technology. Under the five year dual degree Programme both B.Tech. and M.Tech. degrees are awarded after 5 years.

POSTGRADUATE

At postgraduate level the department offers a M.S. (Research) Programme.

RESEARCH

Some of the focal areas of research of the department are:

- Bioprocess Engineering
- Cell and Molecular Biotechnology
- Downstream Processing
- Systems and Computational Biology
- Bionanotechnology

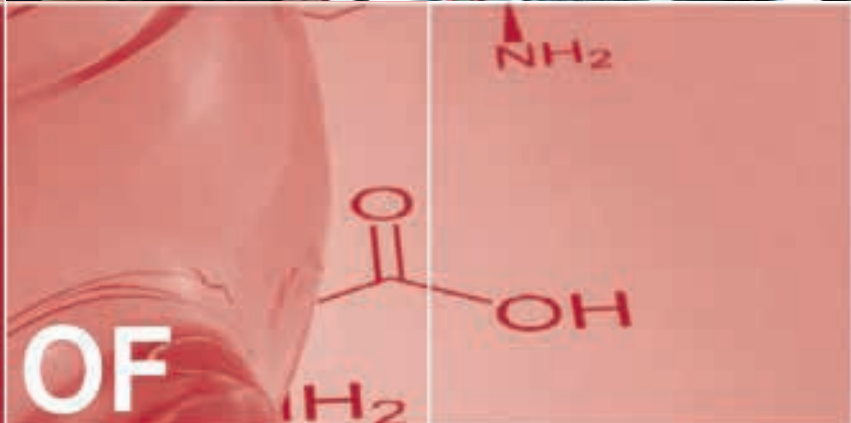
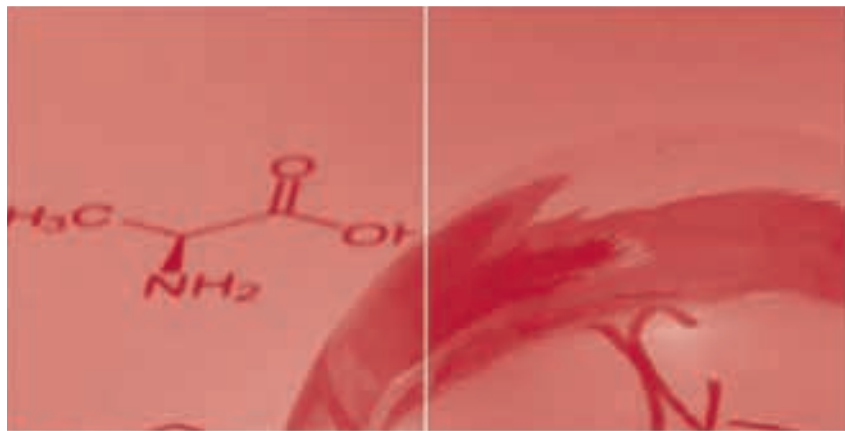
Doctoral research is being carried out in the following areas:

Microbial physiology and biochemistry; Metabolic regulation and engineering; Recombinant DNA technology; Development of expression systems in *Corynebacterium* and *Pichia*, Molecular biology and applications of industrial enzymes, Microbial engineering & technology; Enzyme science and engineering; Animal and plant cell fermentations; Bioreactor design and analysis; Bioseparation and downstream processing systems; Biological waste treatment, Bioenergetics, Biological molecular machines, Biosensors, Protein engineering and structure-function relationship of industrially important proteins. Drug delivery systems, Protein-DNA recognition and Bionanotechnology.

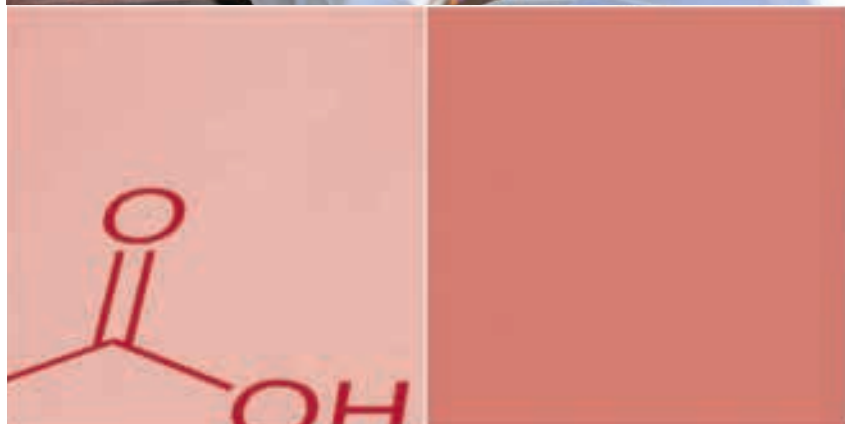
LABORATORY FACILITIES

The Department is well equipped for the teaching and research programs and the equipment and facilities are regularly modernized as per requirements. Major equipment and facilities are: several bioreactors with capacities ranging from 2 to 300 litres, complete with monitoring and control instruments of different parameters such as pH, temperature, dissolved oxygen, redox; Elemental analyzer, HPLC, IC, GC and other chromatography systems; ultra-filtration unit, visible and UV spectrophotometer, CD Spectropolarimeter, Spectrofluorimeter; Fluorescence microscope ultracentrifuge, ultrasonic disintegrator, laminar flow chamber, anaerobic work cabinet, viscometer, lyophilizer, microbial mutation facility, isoelectric focussing unit, scanning laser densitometer, scintillation counter, UF system, FPLC, PCR, RT-PCR electroporation-electrofusion system and facility for working with radioisotopes. Manual nucleic acid sequencing facility, Kodak auto developer. Other infrastructural facilities include a 250 kVA diesel generating set, a 5 kVA uninterrupted power supply system for micro computer and peripherals, boiler, automatic steam sterilizer, constant temperature rooms (37 and 4°C), air compressor and chilled water units. A separate computation lab with several PCs is also available. For transferring laboratory scale data to industrial scale, A pilot plant facility is available. A Bioinformatics Centre sponsored by the Department of Biotechnology, Government of India, under the Biotechnology Information System Network (BTISnet) is also housed in the department.





DEPARTMENT OF
CHEMICAL
ENGINEERING





Rajesh Khanna, Ph.D. (IIT Kanpur)

Professor

Interfacial Engineering, Thin Liquid Films,
Mass Transfer and Numerical Methods, Mist
Reactors, Hairy Roots.

Head of the Department



Siddhasatwa Basu, FNASc, Ph.D.
(IISc., Bangalore)

Professor

Interfacial & Electrochemical Engineering,
Fuel Cells, Enhanced Oil Recovery.

Shalini Gupta, Ph.D. (NC State Univ.)

Assistant Professor

Colloidal Assembly and Nanomaterials,
Lab-on-Chip Systems, Diagnostic Bioassays,
Biosensors.



Ashok Bhaskarwar, Ph.D. (IISc., Bangalore)

Professor

Interfacial science and reaction engineering,
product design, anti-pollution technologies.

Sharad K. Gupta, Ph.D. (Brooklyn Univ.)

Professor

Transport Phenomenon, Membrane
Separation Process.



Divesh Bhatia, Ph.D. (Univ. of Houston)

Assistant Professor

Automotive Catalysis, NOx Emissions,
Monolith Reactors, Kinetics of Fast Reactions.

Gaurav Goel, Ph.D. (Univ. of Texas, Austin)

Assistant Professor

Soft-Condensed Matter, Protein Aggregation,
Self-Assembly in External Fields.



Vivek V. Buwa, Ph.D. (IIT Bombay)

Associate Professor

Computational Fluid Dynamics, Multiphase
Flows, Reactor Engineering.

Mohammad Ali Haider, Ph.D. (Univ. of Virginia)

Assistant Professor

Heterogeneous Catalysis, Solid Oxide Fuel Cells,
Biorenewable Chemicals & Biofuels, Molecular
Modeling, DFT Simulations.



Paresh Chokshi, Ph.D. (IISc., Bangalore)

Assistant Professor

Hydrodynamic Stability, Polymer Processing,
Computational & Theoretical Polymer Physics.

Ratan Mohan, Ph.D. (IIT Kanpur)

Professor

Computational Fluid Dynamics, Process
Engineering and Thermodynamics.





Kamal K. Pant, Ph.D. (IIT Kanpur)

Professor

Heterogeneous Green Catalysis,
Hydrocarbon Treatment and H₂ Production,
Water Treatment.



Sudip K. Pattanayek, Ph.D. (IIT Bombay)

Associate Professor

Thermodynamics & Self Assembly of
Soft Matter, Biopolymers and Nano-Composites.



Jyoti Phirani, Ph.D. (Univ. of Houston)

Assistant Professor

Flow Through Porous Media, Unconventional
Energy Resources, Enhanced Oil Recovery.



Manoj Ramteke, Ph.D. (IIT Kanpur)

Assistant Professor

Process Systems Engineering,
Evolutionary Computation,
Polymer Reaction Engineering.



Anurag S. Rathore, Ph.D. (Yale Univ.)

Professor

Biosimilars, Bioprocessing, Quality by Design,
Process Analytical Technology, Multivariate
Data Analysis (MVDA).



Shantanu Roy, Ph.D. (Washington Univ.)

Professor

Multiphase Reaction Engineering,
Radioactive Trace Particle Tracking.



Jayati Sarkar, Ph.D. (IIT Kanpur)

Assistant Professor

Instabilities and Patter Formation In
Thin Films, Granular Materials,
Computational Fluid Dynamics.

Anil K. Saroha, Ph.D. (IIT Delhi)

Professor

Multiphase Reactors,
Environmental Engineering.



Munawar A. Shaik, Ph.D. (IIT Bombay)

Associate Professor

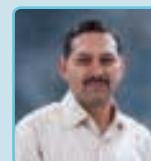
Process Systems Engineering, Modeling,
Optimization and Scheduling of
Chemical Processes.



Anupam Shukla, Ph.D. (IIT Kanpur)

Associate Professor

Membrane Synthesis & Separations,
Electrochemical Systems Engineering.



Vikram Singh, Ph.D. (Cornell)

Assistant Professor

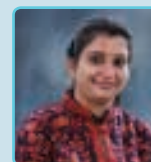
Low Re Number Fluid Mechanics,
Suspensions, Emulsions, Colloids,
Aerosols and Geothermal Energy.



Sreedevi U., Ph.D. (IIT Kharagpur)

Associate Professor

Heterogeneous Catalysis & Reaction Engg.,
Thermochemical & Chemical Pathways
to Renewable Liquid Fuels, Green
Chemical Technologies.



Anil Verma, Ph.D. (IIT Delhi)

Associate Professor

Batteries, Graphene, Microbial & PEM/DM Fuel
Cells, Electrochemical CO₂ Reduction,
C/C Composites.



K.D.P. Nigam, Ph.D. (UDCT, Mumbai)

Emeritus fellow/Professor

Modeling of Flow Systems, Inline Mixing and
Multiphase Flow Reactors.



INTRODUCTION

The Department of Chemical Engineering (ChE) at IIT Delhi, one of the finest in India, is dedicated to providing the best education, research practices and ecosystem to all its associated members. The undergraduate and postgraduate students can choose from a wide range of courses and research projects from the Department's meticulously designed academic program. The courses span from fundamental sciences to complex mathematical relationships and engineering design aspects of chemical and biological process technology. The students are rigorously trained and evaluated on a continuous basis so that they are well prepared to be leaders in whichever field they choose to pursue may it be academia, industry, technology management, entrepreneurship or working for a social cause. The course curriculum is upgraded every ten years to keep up with the changing scenario, requirements and technological advancements around the world.

The Department maintains a vibrant research profile and currently boasts of having one of the best group of faculty members in the country who are not only experts in their respective fields of research but are also engaged in multidisciplinary projects that cater to the broader economic, societal and environmental development and growth of the country. The Department maintains a close liaison with a large number of chemical, biotech companies and design organizations because we believe it is essential to perform basic fundamental scientific research alongside the applied one. The faculty regularly undertakes consultancy assignments in which postgraduate students can make great contributions and students at the undergraduate level are constantly encouraged to identify industrial organizations for summer internships.

Every faculty member has a well-equipped lab in which advanced instruments are kept for use by all the students. Some of the facilities include liquid-liquid extraction columns, autoclaves, large capacity blowers, compressors, gasifiers, combustors, pyrolysis systems, bubble and packed columns, circulating fluidized beds, batch and continuous flow reactors, heat exchangers, carbon-dioxide absorption systems, bench-top optical and electron microscopes, centrifuges, GCMS, TGA, DTA, TPD/TPR, submicron particle size analyzer, powdered particle shape analyzer, high speed photographic equipment, data loggers, high speed multipoint recorders, XRF, HPLC, ion chromatograph, CHN analyzer, viscometer, GC with mass spectrometer, atomic absorption spectrometer, automatic contact angle goniometer and tensiometer, radioactive particle tracking (RPT) system, spin coater and surface plasmon resonance (SPR) spectroscope. The Department also has two pilot plants and a newly refurbished central characterization lab that currently houses an XRD, rheometer and a surface texture analyzer. More instruments are constantly added to this repertoire.

In addition to the analytical instrumentation facilities, there are also extensive computing facilities and softwares like Aspen Plus, SimSci, Fluent, CFX and Promax that are made available to the undergraduate and research students for carrying out their project work. The Department has also set up a state-of-the-art pollution control

and testing laboratory and a process research laboratory provided with 40 intel core 2 duo computers and a state-of-the-art Tata-Honey Well Automation Laboratory.

Approximately once a week, the department organizes a research seminar in which external speakers or our own Ph.D. students present their research work. This helps the students to stay abreast with the latest developments in the Chemical Engineering field and also gives them a perspective about their own research from a global view standpoint. Summer and winter schools under quality-improved program (QIP) are also organized from time to time. With so much happening in the department, we strongly urge you to join us as a student, staff or faculty, or at least pay us a visit when you are in the neighborhood.

VISION

The Department's long-term vision is to become a world leader as a developer of technologies related to energy, environmental protection, novel materials, and healthcare. The Department has been prolific in the areas of materials development for energy generation and storage, catalysis and multiphase reactor engineering, process intensification in non-renewable and renewable energy sectors, modeling and simulation from molecular to process scales, and manufacturing technology for production of biotech therapeutics. We would like to build on our strengths and strive for national and international presence in these areas by continuing our fundamental research and technology development initiatives, and further strengthening our bachelors, masters and doctoral programs. We expect that these endeavors will not only attract superior faculty but will provide and create an enabling ecosystem for students to explore, innovate and smoothly transition into the professional arena. The Department would like to build focused research programs networked with industry, institutions, universities and government agencies. We would like to develop/co-develop effective and affordable technologies scripting joint IPR in partnership with industry, or through consortia leading to spin-offs. The Department strives to promote a technology temperament in society at large, especially to young minds through extensional activities via technology enhanced video and web based distance learning courses, creation of virtual laboratory and resource centres and participating in policy making and public debates.

ACADEMIC PROGRAMMES

The Department offers two undergraduate degrees, one leading to a 4 year B.Tech. and the other to an integrated 5 year Dual Degree (B.Tech. + M.Tech.). At the postgraduate level, the Department offers M.Tech., M.S. (Research) and Ph.D. degrees. The teaching at the undergraduate level aims at providing the students a broad-based education in theory and practice of Chemical Engineering keeping in view the current and future requirements of the country. At the postgraduate level, students are trained to assume independent responsibilities by

laying emphasis on self study component in courses and assigning them TA duties to mentor UG students. Opportunities are provided to the students at all levels to get acquainted with the latest developments in the various areas of Chemical Engineering. Our institute also has an M.O.U. with Ethiopia and we regularly get students from there as part of our M.Tech. and Ph.D. foreign programmes.

UNDERGRADUATE

B.Tech. students need to do a compulsory foundation courses in the areas of basic sciences, humanities and social sciences, and engineering sciences along with Departmental core and elective courses. Departmental courses constitute about half of the total curriculum. Some of the core chemical engineering subjects include fundamentals of mass/heat transfer, chemical reaction engineering, process control, thermodynamics, fluid mechanics, plant design and economics. Students also do open electives to broaden their repertoire of interdisciplinary knowledge-base. Further, there is provision to do a minor degree, for example in computer science and engineering, for which a student needs to do additional credits in the minor area to be eligible for the minor area specialization.

POSTGRADUATE

The 5 year dual degree program (integrated B.Tech. + M.Tech.) in Chemical Engineering is viewed as a high-value added course fit for students who wish to enhance the scope of their B.Tech. degree with one additional year of research experience. The students can take additional elective courses which opens avenues for better placements both in academia and in the industry. The masters of technology (M.Tech.) is a standard two year programme after B.Tech. comprising of one year of rigorous coursework followed by an year of research training under the guidance of a ChE faculty supervisor. The Department also offers M.S. (Research) programme in Chemical Engineering which includes first semester of course work followed by three semesters of rigorous research work. There are also provisions for doing a part-time M.Tech./M.S. for persons already employed in the industry and are looking for value addition in their knowledge base and resumes.

The highly motivated individuals choose to obtain a Doctor of Philosophy (Ph.D.) degree in Chemical Engineering as this is an intensively research-driven program. The students are also expected to qualify a set of the advanced chemical engineering courses in their first year while maintaining a minimum CGPA requirement. The various broad topics of Ph.D. research include renewable and non-renewable energy, catalysis, multiphase reaction engineering and process intensification, complex fluids and rheology, advanced materials, process modeling simulation and optimization, pharmaceutical biotechnology, environmental engineering and waste management.

RESEARCH AREAS

The Chemistry faculty is actively engaged in basic and applied research leading to the award of many Masters and Ph.D. degrees. These projects are sponsored by industries, user organizations and government funding agencies (DST, DBT CSIR, DRDO, MNRE, etc.). The projects are directed towards development of innovative and indigenous technologies for processes relating to efficient heat and mass transfer, design of biosimilars, biomass thermo-chemical conversion processes, hydrodynamics and cold flow studies in trickle beds, packed beds and bubble columns, membrane transport studies, recovery of metals from spent catalysts, oil recovery from emulsion effluents, natural gas production from gas hydrates, solid oxide fuel cells, waste water treatment and design of novel diagnostic bioassays. The research activities of the department can be broadly classified in the following subareas.

Bioseparations and Bioprocessing: Quality by design, biosimilars, process analytical technology, multivariate data analysis, development of novel bioseparations technologies, process modeling, continuous processing.

Colloids and Nanoscale Engineering: Colloidal assembly in external fields, bioresponsive nanomaterials, low-cost bioassays and biomedical devices, drug delivery systems, soft lithography, pattern formation in unstable liquid thin films.

Energy Engineering: Hydrogen generation by PEM water electrolyzer, PEM fuel cell, direct alcohol fuel cell, glucose fuel cell, micro fuel cell, solid oxide fuel cell, utilized regenerative fuel cell, alkaline fuel cell, electrocatalyst, membrane electrode assembly development, development of sustainable technology for hydrogen production, non-conventional energy resources, alternative fuels – biomass to liquid and coal to liquid.

Environmental Engineering: Biological effluent treatment and integrated effluent treatment for water reuse, dispersion of particulates, development of mini cyclones for fine particulates removal, low pressure drop cyclone to reduce specific energy consumption of systems, environmental effect of chemical pesticides, metal ion removal from industrial effluents by bio-sorption, selective dye removal from water by reverse micelles and reuse of dye, performance and evaluation of anaerobic GAC expanded bed reactors, recovery of oil from emulsion effluents of steel rolling mills and process industries, development of new pollution preventing writing and printing inks, paints, fuels sustainable carbon-capture technologies, NO_x reduction technologies such as lean NO_x traps and selective catalytic reduction.

Fluid and Particle Mechanics: Characterization of particles, communitation and gas-solid separation, flows through silos, pneumatic conveying of solids and flow through porous media, flow over deformable solids, hydrodynamic stability.

Heterogeneous Catalysis: Preparation, characterization and catalytic studies of various supported transition metal catalysts, metal oxides and zeolites.

Interfacial Engineering: Microfluid mechanics in manufacturing of fine chemicals, food processing, enhanced oil recovery, paint technology and polymer coating, applications of interfacial engineering to effluent treatment, agglomeration in re-refining of used engine oils, role of interfacial phenomena in wetting of reactor packings, incorporation of fundamentals of interfacial science into crop protection strategies.

Molecular Dynamics Simulations: Structure-property relationships in soft-condensed matter, protein folding and aggregation studies, directed self-assembly in external fields.

Density Functional Theory (DFT) Simulations: Theoretical understanding of catalytic and electrocatalytic reactions is developed by Density Functional Theory (DFT) simulations, performed using Vienna ab-initio Simulation Package (VASP). The simulations help in developing a better mechanistic understanding leading to the nanoscale design of the catalytic materials and guiding routes for efficient catalytic transformation.

Petro Technology: Design, performance and scale-up studies on major equipment used in petroleum and petrochemical industries such as trickle bed reactors, coil flow inverters, motionless mixers and continuous film contactors, sulphonation of crude and surfactant synthesis, enhanced oil recovery, re-refining of used engine oils, flow through porous media, reservoir simulation.

Polymer Physics and Engineering: Structure-property of polymeric materials, polymer chain simulations, polymer crystallization, rheology and flow of polymer melt and solution, polymer nano-composites, polymer at interfaces.

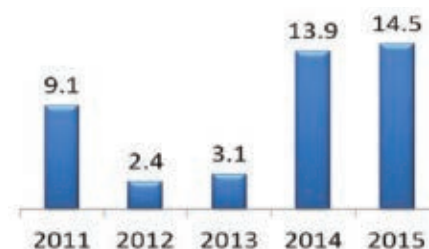
Process Systems Engineering: Planning and scheduling of batch and continuous process operations, process optimization, advanced process synthesis, process plant simulation and control, scheduling and planning, heat-exchanger network synthesis, water allocation network synthesis, modeling and simulation of polymer reactors, optimization and optimizing control of polymer reactors, stochastic optimization techniques: genetic algorithm, simulated annealing and other advanced computing techniques.

Reactor and Reaction Engineering: Intrinsic kinetics of various industrially important reactions including both homogeneous and heterogeneous (gas-liquid, gas-solid, both catalytic and non catalytic), hydrodynamics, mixing, heat and mass transfer, steady state multiplicity, chaos and control, limit cycles, design, performance and scale-up strategies for packed columns, bubble columns, mechanically agitated contactors, trickle bed reactors, foam bed reactors, film reactors, monolith reactors, continuous film contactors, standardization of the use of radioisotopes as nondestructive methods of measurements of reactor hydrodynamics, wetting characteristics of reactor packing, photochemical and photo-electrochemical reactors, IS process technology development, and XTL.

Separation Science and Technology: Membrane separation, ion exchange and adsorption processes, development of design equations for reverse osmosis, modeling of protein transmission in ultrafiltration membranes, estimation of mass transfer coefficient from the measurements of the membrane separation systems. Removal of dye from water using colloidal gas aphyrons and reverse micellar extraction, de-bittering of fruit juices for improved shelf life and taste.

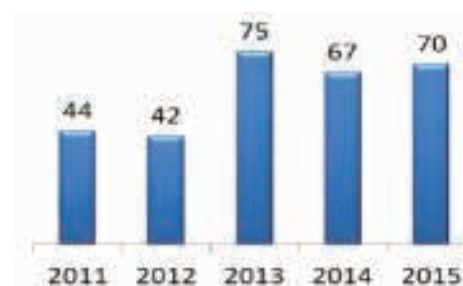
A FEW DEPARTMENTAL RESEARCH STATISTICS (2011-2015)

Research funding: The Department is highly proactive in writing research grants. This has resulted into sponsored R&D Projects worth of INR 37.2 Cr over the last five years. The faculty also regularly does industrial consultancy work which has lead to sanctioning of projects worth INR 5.8 Cr. The year-wise split is shown in the adjoining bar graph.

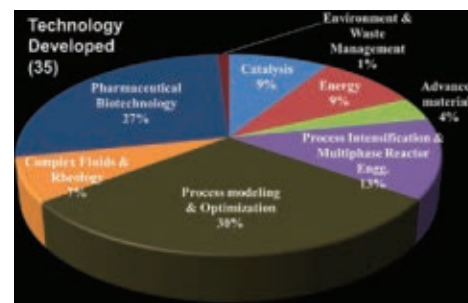


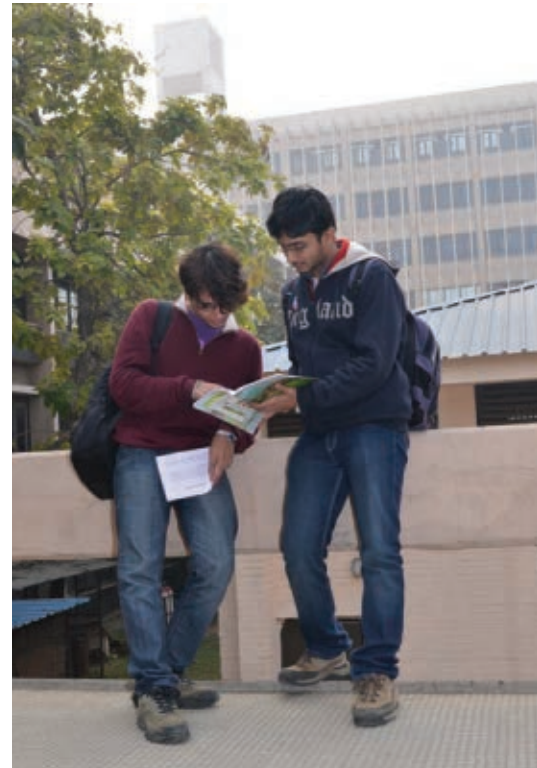
Number of peer reviewed international journal publications:

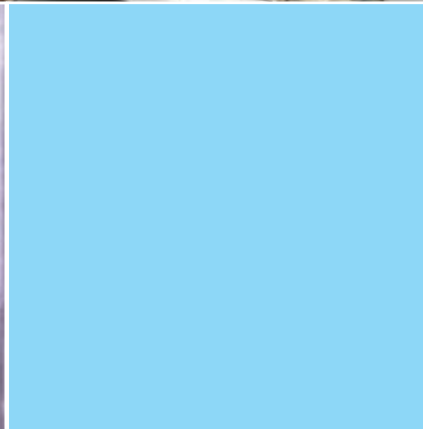
The Department is also very productive in writing scientific articles. These articles are published in international journals of great repute. The year-wise data of the number of international journal articles published in the last 5 years is given in the adjoining graph. As can be seen, the number has increased significantly in the last 3 years.



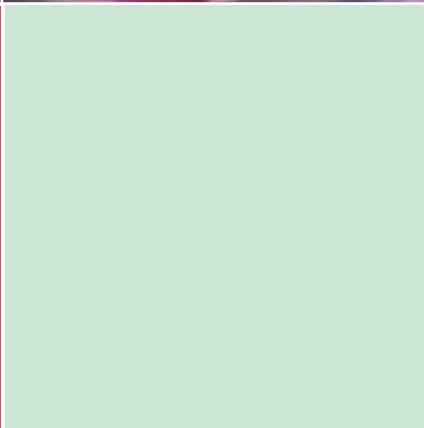
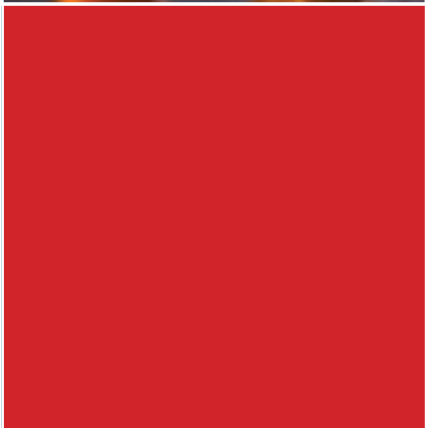
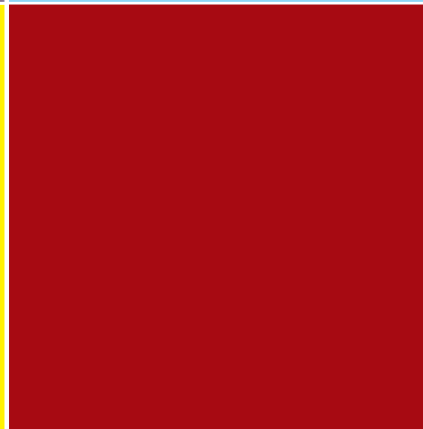
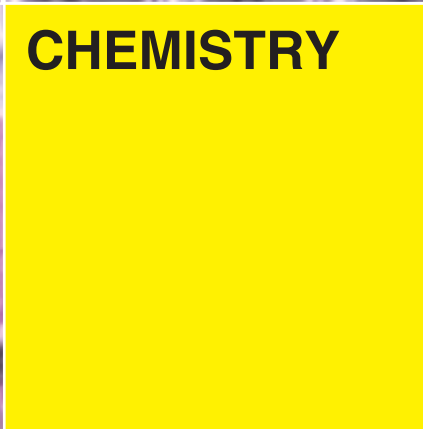
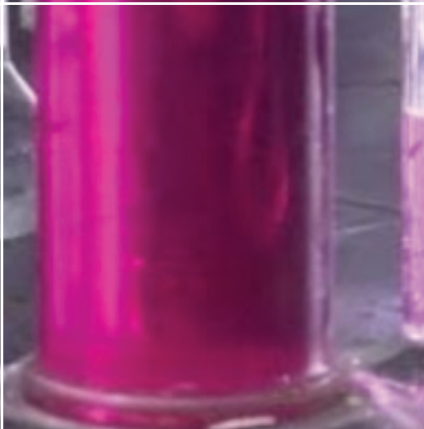
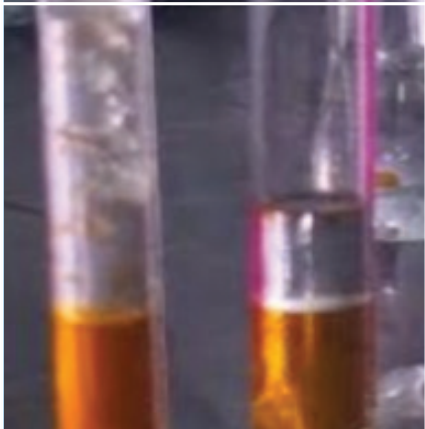
Technology developed: No scientific expedition is complete without validation of its potential for technology development and our faculty focuses on this aspect tremendously in their research endeavors. The layout of technology developed in the last 5 years in the different research areas including renewable and non-renewable energy, catalysis, multiphase reaction engineering and process intensification, complex fluids and rheology, advanced materials, process modeling simulation and optimization, pharmaceutical biotechnology, environmental engineering and waste management., is shown in the adjacently shown pie chart.







DEPARTMENT OF CHEMISTRY





Ravi Shankar, Ph.D. (Punjab Univ.)

Professor

Inorganic Polymers, Organometallic Chemistry/ Coordination chemistry of silicon, germanium and tin.

Head of the Department



D.K. Bandyopadhyay, Ph.D. (I.A.C.S)

Professor

Metalloporphyrin catalyzed oxidation reactions of organic and organometallic compounds: Kinetics & Mechanistic studies.

Ashok K. Ganguli, Ph.D. (IISc., Bangalore)

Professor

Chemistry of Novel materials (dielectric oxides, Superconductors and Nanomaterials).



Pramit K. Chowdhury, Ph.D. (Iowa State Univ.)

Associate Professor

Physical and Biophysical Chemistry, Protein Folding using Single Molecule Confocal Microscopy.

Shivajirao L. Gholap, Ph.D. (IISc., Bangalore)

Assistant Professor

Natural Product Synthesis and Their Biological Studies, Development of New Synthetic Method and Its Application In Organic Synthesis.



Shashank Deep, Ph.D. (IIT Delhi)

Associate Professor

Physicochemical Characterization of Macromolecule Interaction and Biophysical Studies of Protein Folding and Protein Aggregation Surface using Multinuclear NMR Spectroscopy, Fluorescence, Microscopy and Different Calorimetric Techniques.

V. Haridas, Ph.D. (NIIST, Trivandrum)

Associate Professor

Chemical Biology of Peptides and Proteins, Biophysics of Peptide/Protein Folding.



Tanmay Dutta, Ph.D. (Calcutta University)

Assistant Professor

Biochemistry, Enzymology, Molecular RNA Biology, Genetics.

Pravin P. Ingole, Ph.D. (University of Pune)

Assistant Professor

Electrochemical techniques, Electroanalysis, Nanomaterials.



Anil J. Elias, Ph.D. (IIT Madras)

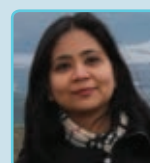
Professor

Synthetic Main Group and Organometallic Chemistry.

Nidhi Jain, Ph.D. (Delhi Univ.)

Associate Professor

Nanocatalysis in Organic Synthesis, Ionic Liquids, Structural Studies of DNA-Carcinogen Adducts.





B. Jayaram, Ph.D. (City Univ. New York)

Professor

Biomolecular Modeling and Simulation,
Physicochemical Model for DNA Sequence Analysis,
Ab Initio Protein Structure Prediction, Active Site
Directed Drug Design.



Hemant Kumar Kashyap, Ph.D. (Jadavpur Univ.)

Assistant Professor

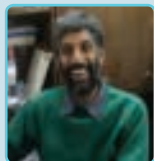
Statistical Mechanics of Soft-Matter, Molecular
Dynamics Simulations, Ionic Liquids, Lipid-Membranes.



Sunil Kumar Khare, Ph.D. (IIT Delhi)

Professor

Biochemistry, Enzyme Technology, Applied
Microbiology synthesis.



Narayanan D. Kurur, Ph.D. (Caltech Univ.)

Professor

NMR Methodology.



Selvarajan Nagendran, Ph.D. (IIT Kanpur)

Associate Professor

Chemistry of Group 13 and 14 Elements with
Special Emphasis to the Low-valent Compounds
of Silicon.



Siddharth Pandey, Ph.D. (North Texas Univ.)

Professor

Optical Spectroscopy, Advanced Fluorescence
Techniques, Molecularly Organized Media,
Environmentally Friendly Solvent Systems,
Chemosensors, Photophysical Processes.



Nalin Pant, Ph.D. (Princeton Univ.)

Professor

Theoretical and Experimental Studies
on Molecular Conformation, Molecular
Recognition.

Arunachalam Ramanan, Ph.D. (IISc., Bangalore)

Professor

Solid State Chemistry, Crystal Engineering,
natural and synthetic materials.



N.G. Ramesh, Ph.D. (IIT Madras)

Professor

Synthetic Organic Chemistry, Carbohydrate
Chemistry, Asymmetric Synthesis.



Sameer Sapra, Ph.D. (IISc., Bangalore)

Associate Professor

Nanomaterials, Semiconductor Nanocrystals,
Quantum Dots, Light Emitting Devices, Charge
Transfer and Photovoltaics.



Ajai Kumar Singh, Ph.D. (Delhi Univ.)

Professor

Organochalcogen Ligand Chemistry,
Designing of Metal Complexes for Catalyzing
Organic Reactions.



Jai Deo Singh, Ph.D. (Lucknow Univ.)

Professor

Chemistry of Chalcogens/Organo-
Chalcogens and their Applications in Organic
Synthesis & Catalysis, Organic metals and
Superconductors.



Ravi P. Singh, Ph.D. (IIT Kanpur)

Assistant Professor

Asymmetric Catalysis, C-H and C-F Activation,
Total Synthesis of Small Molecules.



INTRODUCTION

The Department offers M.Sc., M.Tech. and Ph.D. programmes in Chemistry and also caters to chemistry courses for B.Tech. students in engineering disciplines. It provides good opportunities for research at doctoral and post-doctoral level research on a variety of topics in conventional and interdisciplinary areas of Chemistry. As a part of its academic activities, the department organises seminars, symposia, summer schools as well as winter workshops. It also undertakes industrial consultancy projects and has ongoing collaborative research projects in frontier areas with institutions in India and abroad.

ACADEMIC PROGRAMMES

POSTGRADUATE

M.SC.

The Four-Semester Master of Science in Chemistry is designed to provide a broad-based training in physical, inorganic and organic chemistry. Courses in biochemistry and analytical chemistry are also included in the core programme. Students are offered choice of electives in various specialized areas like solid state chemistry, organometallic chemistry, statistical mechanics, bioorganic chemistry and immunochemistry. Students are required to also take two electives from outside the department. The project in second year initiates the students into research work in various branches of Chemistry.

M.TECH.

The M.Tech. Programme in Molecular Engineering: Chemical Synthesis and Analysis is one-of-a-kind programme in the country which provides advanced training in the design, synthesis, separation, and characterization of molecules while preparing students for careers in industry or academia. In addition, students are offered choice of electives in various specialized areas of chemistry, chemical and polymer engineering and management. It culminates in a year-long project where the foundation for scientific research is laid.

RESEARCH AREAS

The department is actively engaged in research including doctoral research, in all contemporary areas of chemistry. Major disciplines include Analytical, Inorganic, Organic, Physical Chemistry and Biochemistry.

- **Analytical Chemistry:** Optical Spectroscopy, Environmental / Chemical Analysis, Electroanalytical Methods.

- **Biochemistry:** Enzyme Stability and Stabilization, Nonaqueous Enzymology, Bioseparation, Peptide Synthesis for Molecular Device Construction, Computer Aided Molecular Design, Enzyme Immobilization and Bioconversions, Microbial Biochemistry, Extremozymes and Extremophiles, Nanobiotechnology, Structural biology, inhibition of amyloid formation, ligand receptor interaction.
- **Inorganic Chemistry:** Organometallic Chemistry of Main Group/Transition Elements, Inorganic Polymers.
- **Supramolecular Chemistry:** Metallo porphyrins as Catalysts, Intermetallic Compounds, Chemistry of Materials, Nanocrystalline Solids, Coordination Polymers, Crystal Engineering, Catalysis through Organometallic Compounds.
- **Organic Chemistry:** Total Synthesis of Natural Products and New Synthetic Methods, Transition–Metal Compounds in Organic Synthesis, Synthetic Carbohydrate Chemistry, Peptides, Proteins and other Natural Products, Chemistry of Singlet Oxygen, Molecular Recognition and Organization, Supramolecular Chemistry, Bioorganic Chemistry, Kinetics and Mechanism of Organic Reactions, Ionic Liquids in Organic Synthesis.
- **Physical Chemistry:** Statistical Thermodynamic investigations of Chemical and Biochemical Systems via Computer, Electrochemical techniques, Electroanalysis, Nanomaterials, Simulations, Theoretical Studies on Protein-DNA and Drug-DNA and receptor-ligand Interactions. Simulation Methods for Quantum Systems, Clusters, Magnetic and Photophysical Properties of Intercalated Materials. Structural and Physico-Chemical Characterization of Protein-protein Interaction and Protein Stability, Understanding Complex Fluidic Systems, Protein Folding and Aggregation using Single Molecule Confocal Microscopy and NMR. Optical and Electronic Properties of Nanomaterials, Electrocatalysis/Photocatalysis Nanomaterials, Superconducting materials, Kinetics and Thermodynamics of Crystallization, Room-Temperature Ionic Liquids, Membrane Bi-layers and Vesicles.

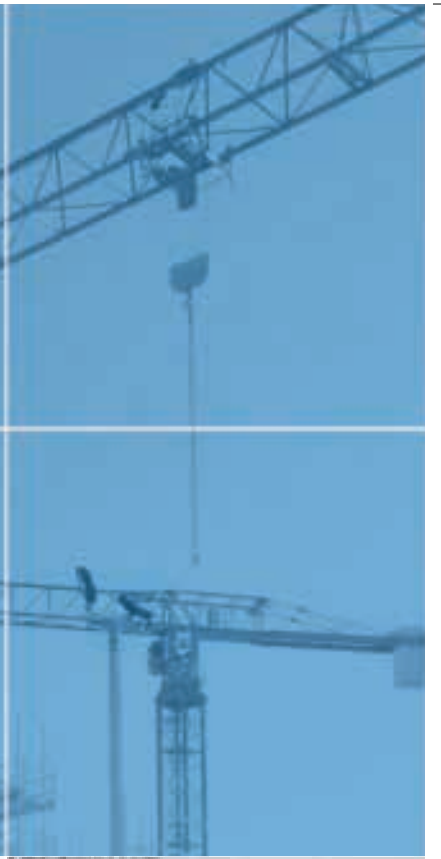


LABORATORY FACILITIES

The following equipments are available in the laboratories of the department.

Single Crystal X-ray Diffractometer (Bruker). Powder X-ray Diffractometer (Bruker). DPX-300 NMR Machine (Bruker). FTIR Spectrometer (Nicolet, Protege 460). UV-Visible Spectrophotometer (Lambda Bio 20, Perkin Elmer / Model 330, Hitachi, Beckman). Thermal Gravimetric Analyzer (Perkin Elmer). Differential Scanning Calorimeter (Perkin Elmer). C, H, N Analyzer 2400 (Perkin Elmer). Fluorescence Spectrometer. Lifetime Fluorescence Spectrometer. Fast Protein Liquid Chromatography. Gas Chromatograph (Dionex). Gel Permeation Chromatography. High Pressure Liquid Chromatograph (Waters 1525) GPC. Vapour Pressure Osmometer (Knauer). Polarimeter (Rudolph). Ion Chromatograph (792 Basic IC, Metrohm). Supercomputing Facility for Bioinformatics and Computational Biology. Glass Blowing. Polymerase Chain Reaction System. Gel Documentation System. CD Spectrometer. Dynamic Light Scattering System. Glove Box. ESI - MS/MS Mass Spectrometer. (Bruker).





**DEPARTMENT OF
CIVIL
ENGINEERING**





Manoj Datta, Ph.D. (IIT Delhi.)

Professor

Geotechnical Engineering, Geoenvironment, Landfills, Ash Ponds, Tailings, Ground Improvement, Slope Stability, Dams, Offshore Geotechnology.

Head of the Department



B.J. Alappat, Ph.D. (IIT Bombay)

Professor

Environmental Engineering, Solid Waste Management, Incineration, Fluidized Bed Operations.

Shashank Bishnoi, Ph.D. (EPFL, Switzerland)

Assistant Professor

Experimental and Numerical Studies into Hydration of Cements and Supplementary Cementitious Materials, Sustainability, Durability and Life Cycle Costs of Concrete Structures.



R. Ayothiraman, Ph.D. (IIT Madras)

Associate Professor

Soil Dynamics and Earthquake Geotechnical Engineering, Pile Foundations, Deep Excavation and Tunnelling in Soft Ground, Problematic Soils and Ground Improvement, Experimental Geotechnics.

B.R. Chahar, Ph.D. (IIT Roorkee)

Professor

Canal Design, Groundwater Modelling and Artificial Recharge, Seepage and Drainage, Stream - Aquifer Interaction, Optimization, Numerical Techniques.



Gurmail S. Benipal, Ph.D. (IIT Delhi)

Associate Professor

Structural Engineering, Nonlinear Dynamics and Stability, Constitutive Modelling, Concrete Mechanics: Creep, Elastoplasticity, Damage, Cable Dynamics.

Sumedha Chakma, Ph.D. (IIT Delhi)

Assistant Professor

Settlement in Landfills, Gas Generation from Landfills, GIS Based Landfill Management, Bioreactor Landfill, Infiltration Characteristics of Different Vegetation and Landuse, Watershed Management, Water Contamination and Remediation, Open Channel Hydraulics, Contaminant Hydrology.



Suresh Bhalla, Ph.D. (Nanyang Tech. Univ.)

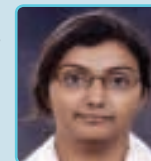
Associate Professor

Structural Mechanics, Structural Health Monitoring, Smart Materials & Structures, Tensegrity Structures, Underground Structures, Bio-mechanics, Green Structures.

T. Chakraborty, Ph.D. (Purdue Univ.)

Assistant Professor

Foundation Engineering, Soil Plasticity and Constitutive Modeling, Blast Loading in Soil, Soil-Structure Interaction and Underground Construction in Soil and Rock.



B. Bhattacharjee, Ph.D. (IIT Delhi)

Professor

Durability of Concrete, Rebar Corrosion, Cement based Composites, Construction Technology, Building Science, Green Building, Sustainability.

S.K. Deb, Ph.D. (IIT Delhi)

Associate Professor

Transportation Engineering, Urban Engineering, Fuzzy System Modelling, Airways, Academic Programmes.





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Assistant Professor

Hydroclimatological Modelling, Nonlinear Dynamics and Chaos Theory, Stochastic Hydrology, Optimization in Water Resource Systems, Data Mining in Hydrology, Water Resources Management.



Abhijit Ganguli, *Ph.D. (ULB, Belgium)*

Assistant Professor

Non-destructive Evaluation, Structural Dynamics and Control Systems, Mechatronics, Ultrasonics, Solid Mechanics.



N.K. Garg, *Ph.D. (Wales Univ.)*

Professor

Water Resources System, Finite Element, Watershed Modelling, Irrigation Management, CAD.



A.K. Gosain, *Ph.D. (IIT Delhi)*

Professor

Integrated Watershed Modelling, GIS Hydrological Modelling, Irrigation Management, Environmental Impact Assessment.



Ashok Gupta, *Ph.D. (IIT Delhi)*

Professor

Structural Engineering, Earthquake Engineering, Health Monitoring of Structures.



Supratic Gupta, *Ph.D. (Nagoya Univ.)*

Assistant Professor

Structural Engineering, FEM Analysis, Constitutive Modelling of Material and Structures, Concrete Mechanics, Self Compacting and High Performance Concrete.

Gazala Habib, *Ph.D. (IIT Bombay)*

Assistant Professor

Source and Atmospheric Aerosol Characterization, Regional Air Quality, Health, Source Apportionment Modelling, Climate Effect and Climate Modelling.



K.C. Iyer, *Ph.D. (IIT Madras)*

Professor

Construction Engineering and Management, Contracts and Arbitration, Structural Engineering, VDC and Building Information Model, Project Risk.



A.K. Jain, *Ph.D. (IIT Delhi)*

Professor

Design of RCC and Steel Structures, Earthquake Engineering, Wind Engineering, Offshore Structures, Dynamic Testing of Structures.



K.N. Jha, *Ph.D. (IIT Delhi)*

Associate Professor

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D.R. Kaushal, *Ph.D. (IIT Delhi)*

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Hydraulic and Water Resources Engineering, Computational Fluid Dynamics, Sediment Transport, Hydraulic Structures, Slurry Pipeline, Flow Instrumentation.



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Groundwater Flow and Pollution Modelling, Remote Sensing and GIS, Hydrology, Optimization and FEM, EIA and Hydrogeological Hazard.





Mukesh Khare, Ph.D. (New Castle Univ.)
Professor
 Air and Vehicular Pollution Modelling, Indoor Air Pollution, Urban Air Quality Management.

Shashi Mathur, Ph.D. (Delaware Univ.)
Professor

Groundwater Contamination Bioremediation of Soils, Flow through Porous Media, Phyto-remediation, Biodegradation in Landfills.



Rakesh Khosa, Ph.D. (IIT Delhi)
Professor
 Water Resources Systems, Stochastic Processes, Conflict Resolution and Hydrologic Modelling of Large River Basin.

Vasant Matsagar, Ph.D. (IIT Bombay)
Associate Professor

Structural Engineering, Earthquake and Wind Engineering, Offshore Structures, Fiber Reinforced Polymer Composites, Finite Element Analysis, Blast & Fire Engineering, Multi-hazard Protective Structures.



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 Human Health Risk Assessment, Nanoparticles, Water Treatment, Decision-making, Emerging Contaminants.

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 Earthquake Engineering, Nonlinear Structural Dynamics, Concrete Structures, Computing in Structural Engineering, Structural Masonry.

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Professor

Geotechnical Earthquake Engineering, Dynamic Site Characterization, Machine Foundations, Environmental Geotechnology, Geosynthetics.



B. Manna, Ph.D. (IIT Kharagpur)
Assistant Professor
 Foundations for Industrial Machines, Dynamic Soil-Pile Interaction, Soil Dynamics, Foundation Engineering, Geotechnical Earthquake Engineering.

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ANN Control of Building Frames, MIS, System Administration, Development of Application Software.





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and Travel Demand Modelling, Road Safety.



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Rock Mechanics and Rock Engineering,
Geotechnical Engineering, Engineering
Geology, Seismic Microzonation.



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Supplemental Damping and Energy Dissipation,
Earthquake Engineering, Performance Based
Seismic Design, Strengthening, Retrofitting,
Steel & Concrete Structure, Large-Scale Seismic
Testing, Dampers.



J.T. Shahu, Ph.D. (IIT Kanpur)
Professor
Geotechnology for Tracks and Pavements,
Constitutive Modelling of Soils, Ground
Improvement, Geosynthetics.

Aravind K. Swamy, Ph.D. (New Hampshire Univ.)
Assistant Professor
Pavement Engineering, Constitutive Modeling of
Pavement Materials, Damage Mechanics.



Geetam Tewari, Ph.D. (Univ. of Illinois)
Professor
Transportation Planning, Public Transport
Systems, Non-Motorised Vehicle Planning,
Traffic Safety.



A.K. Nagpal, Ph.D. (IIT Delhi)
Dogra Chair Professor
Structural Engineering, Tall Buildings, Bridges,
Earthquake Engineering.



K.G. Sharma, Ph.D. (Wales Univ.)
Emeritus Professor
Constitutive Modelling, Dams Underground
Structures, Slope Stability,
Computational Methods.



INTRODUCTION

The Civil Engineering Department at IIT Delhi was established along with the inception of the Institute in 1961. It now offers a regular four year bachelor's degree in Civil Engineering, and eight different M.Tech. Programs along with M.S. (Research) and Ph.D. Programs in different frontier areas of research in Civil Engineering. The Department has faculty of international reputation and possesses laboratories/research/computational facilities comparable to any lead in university of the world. It promotes industry-academia interaction through consultancy services and undertakes cutting-edge research through sponsored research projects. The department also takes a lead role in ensuring that the advancements in Civil Engineering and Technology reach service professionals through training and continuing education programs. The Department undertakes curriculum development activities by updating the existing course, developing new courses and preparing resource materials for teaching.

ACADEMIC PROGRAMME

UNDERGRADUATE

The undergraduate curriculum is broad-based and is designed to introduce the students to the wide range of problems encountered by civil engineers. The major components of the curriculum are Geotechnical Engineering, Structural Engineering, Water Resources Engineering, Environmental Engineering, and Transportation Engineering.

POSTGRADUATE

The postgraduate courses of the Department cover a wide range and enable students to specialize in one of the programmes listed below and also to study courses in other fields of interest in the department. In addition, each M.Tech. student is required to do a major project which involves introduction to the methodology of research or design and development and submit a dissertation. The specialization in M.Tech. Programmes are:

- Construction Engineering and Management
- Environmental Engineering and Management
- Geotechnical and Geoenvironmental Engineering
- Rock Engineering and Underground Structures
- Structural Engineering
- Water Resources Engineering
- Transportation Engineering
- Construction Technology and Management (Industry Sponsored)

RESEARCH AREAS

The Department offers doctoral and post-doctoral research programmes in the following areas:

Building Science and Construction Management: Quantification in Industrial Research, Quantitative Techniques and Monitoring in Management of Capital Projects; Network Techniques for Scheduling and Resources Allocation Problems; Contract Management; Value Engineering. Durability, Creep, Shrinkage and Temperature Effects of Concrete, Fiber Reinforced and Special Concrete, Corrosion of Reinforcing Steels. Energy Efficient Building, Building Sciences, Asset Management, Project Success Factors, Green Buildings.

Design, Planning and Management, Lean Construction, Automation in Design & Construction.

Engineering Geology: Weathering Processes and their Effects, Petrography of Aggregate, Rock Drill Ability, Geomorphology, Terrain Evaluation, Landslide Hazard Zonation, Seismic Microzonation and Waste Disposal in Rocks, Hill Slope Engineering.

Environmental Engineering: Water Supply and Wastewater Engineering, Industrial Pollution Control, Physico-Chemical, Biological and Thermal Treatment Techniques for Wastes and Wastewaters, Emerging Molecules in the Environment, Solid Waste Management, Fluidized Bed Reactors, Carbon Sequestration, Environmental Impact and Risk Assessment, Microbiological Risk Assessment, Environmental Indices, E-Waste Management, Nanoparticles in the Environment, Human Health Risk Assessment, Air Pollution and Control, Urban and Regional Air Quality Management, Indoor Air Pollution, Aerosols, Chemical Constituents, Precursor Gases, Source Profile Development, Atmospheric Chemistry, Receptor Modeling, Climate Modeling, Benchmarking, Endocrine Disrupting Chemicals and Personal Care Products in Environment.

Geoenvironmental Engineering: Hazardous Waste Landfills, Municipal Solid Waste Landfills, Ash Ponds, Ash Utilization, Mine Tailings Dams, Waste Mounds, Liners, Covers, Vertical Barriers, Geotechnical Reuse of Waste Materials.

Offshore Structure: Fixed and Floating Offshore Oil Production Platforms-Steel Jackets, Concrete Gravity Platforms-Guyed Towers, Tension Leg Platforms, Articulated Towers, Modelling of the Sea Environment: Soil-Structure-Fluid Interaction; Model Analysis for Linear and Non-linear Systems; Submarine Pipeline; Dynamics of Floating Bodies.

Rock Engineering: Strength and Deformation of Rocks and Rock Masses, Joint Systems, Application of Finite Element Method, Boundary Element Method and other Methods, Stresses and Deformation around Underground Openings, Stability of Rock Slopes, Subsurface Exploration by Geophysical Methods, Geomechanics Modelling, Underground Support Systems, Ground Improvement, Servo Controlled Stiff Testing Machine, Environmental Hazards.

Soil Engineering: Shear Strength Behavior under Generalised Stress and Strain, under Partial Saturation, under High Stresses, under Cyclic Load; Shallow and Deep Foundations; Constitutive Relationships of Soils; Application of Finite Element, Boundary Element and Finite Difference Methods to Analysis of Problems of Flow, Stability, Substructures, Earth and Earth Retaining Structures and Soil-Structure Interaction; Reinforced Soil Structures; Geosynthetics; Marine Geotechnology; Environmental Geotechnology; Ground Improvement; Geotechnical Earthquake Engineering, Seismic Microzonation; Geotechnology related to Roads and Railway Tracks.

Structural Engineering: Nonlinear Dynamics and Stability, Elasto-plasticity, Performance- based Seismic Design, Strengthening, Large-scale Seismic Testing, Micro-structural Modeling, Hydration of Cements and Supplementary Cementitious Materials, Smart materials & Structures, Structural Health Monitoring, Bio-mechanics, Engineered Bamboo Structures, Energy Harvesting, Sustainability, Durability and Repair of Concrete Structured, Blast, Fire and Wind Engineering, Multi-hazard Protective Structures, Green Building, Non-destructive Evaluation, Structural Dynamics and Control Systems, Mechatronics.

Surveying and Remote Sensing: Land and Geographic Information Systems, Multipurpose Surveys using Aerospace Data, Remote Sensing Applications to Land and Water Resources, Environmental Problems, Analytical Photogrammetric Control Extension.

Transportation Engineering: Travel demand modeling, Public transport planning and operations (BRT, Metro, LRT, Bus systems), Traffic engineering and management, Traffic flow modeling and simulation (heterogeneous traffic), Pedestrian dynamics and evacuation modeling, Transportation system analysis, Urban and regional transportation system planning, Planning and modeling of non motorized transport system (pedestrian, bicycles), Traffic safety, Accident prediction modeling, Highway safety analysis, Evaluation of pavement materials, Modeling of pavement materials, Pavement Design and Modelling Economic Analysis to Transportation Systems, Airport engineering, Continuum damage mechanics, Recycling of pavement materials, Bitumen rheology.

Water Resources Engineering: Surface and Groundwater Hydrology, Flood Forecasting, Hydraulic and Hydrological Modelling, Irrigation, Drainage, Erosion and Sedimentation Problems, Mathematical Modelling of Geophysical Systems, Planning and Management of Water Resources Systems, Environmental Impact Assessment. Groundwater Contamination, Bio-remediation, Watershed Management, Physically Based and Statistical Modelling of Hydrologic Systems, Rationalization of Floods through Pattern Analysis, GIS and Remote Sensing, Finite Element and Optimization Methods in Water Resources.

Doctoral research is being carried out in the following areas:

Structural Dynamics and Control Systems, Elastodynamics and Stability, Smart materials & Structures, Structural Health Monitoring, Engineered Bamboo Structures, Micro-Structural Modelling of Cements and Supplementary

Cementitious Materials, Durability of Concrete Structures, Multi-hazard Protective Structures, Green Building, Earthquake Engineering, Wind Engineering, Structural Control, Reinforced Concrete Structures, Bridge Engineering, Offshore Structures, Tall Buildings, Soil Structure Interaction, Fiber Reinforced Polymer Composites, Fire Engineering, Blast Resistant Structures, Waste Utilization in Building Materials, Corrosion of Concrete/ Reinforced Concrete, Performance Life Prediction of Structure, Fatigue, and RC Mechanics, Neural Network, Brick Masonry, Constitutive Modelling: Creep, Elastoplasticity, Damage of Concrete, Rebar Band Modelling Self Compacting and High Performance Concrete, Smart Structures Non-Destructive Testing & Evaluation of Structures, Geological Engineering, Rock Weathering, Aggregate Reaction, Rock Mechanics, Geophysical Methods, Stability of Rock Slopes, Underground Structures, Numerical, Physical and Geomechanical Modelling, Geosynthetics in Infrastructure Projects, Soil Mechanics, Foundation Engineering, Earth Dams, Earth Retaining Structures, Geosynthetics, Reinforced Soils, Environmental Geotechnology, Marine Geotechnology, Earthquake Geotechnics, Soil Dynamics, Geotechnology for Roads and Railway Tracks. Biological Processes for Wastewater Management: Upflow Anaerobic Sludge Blanket Reactors, Constructed Wetlands, Compact Activated Sludge Process; Urban Water, Water Quality Modeling, Urban Air Quality Management including Monitoring and Modeling, Indoor Air Pollution Modeling, Vehicular Pollution Modeling, Source and Atmospheric Aerosol Characterization, Emission Inventory Development, Receptor Modeling, Climate Modeling, Human Health Risk Assessments, Nanoparticle Removal, Nanoparticle Toxicity to Bacteria, Multi-criteria Multi-objective Multi-stakeholder Decision making, Emerging Molecules in the Environment, Carbon Sequestration through Mineral Carbonation, Engineered Landfills, GHG emissions from reservoirs, Circulating Fluidized Bed Operations, Environmental Forensics. Thermal performance of buildings and Energy Efficient Building Design. Contraction Management System Engineering and Design, Transport planning; Transport policy; transportation safety; construction work zone safety; Heterogeneous Traffic flow modeling; Traffic safety and capacity of hill roads; Mass transportation planning; Fuzzy systems; urban transport infrastructure planning and design; Expert systems in transportation engineering; Environmental impact assessment; Non-motorized transport planning; Modeling of pedestrian behavior; Geometric design of transportation infrastructure; Characterization of pavement materials; Pavement design (flexible and rigid); Damage modeling of bitumen and bituminous mixtures; Constitutive modeling of pavement materials; Recycling of civil infrastructure materials; Rheology of asphaltic materials; Condition assessment of highway infrastructure; Pavement management systems; Highway engineering; Airport infrastructure. Environmental Impact Assessment of Transportation and Urban Environment, Mathematical Modelling in Water Resources, Flood Forecasting, Statistical Modelling in Hydrology, Water Resources Systems, Surface and Ground Water Quality Modelling, River Hydraulics, Applications of Remote Sensing Techniques in Water Resources, Soil Characteristics, Watershed Modelling, Vegetation and Crop response to Moisture, Application of Neural Networks in Water Resources Modelling; Bio-remediation of Soils, Irrigation Water Management, Climate Change and its Impact on Water Resources; GIS Applications in

Water Resources Modelling; Morphotectonic and Geological Studies. Natural Hazards such as Landslides, Coastal Erosion etc. and Environmental Monitoring, Pattern Recognition in Remote Sensed Data, Digital Terrain Modelling and Computer Applications and Photogrammetry

LABORATORY FACILITIES

Structural Engineering Laboratories is a cluster of 10 laboratories, namely Concrete Structures Laboratory, Heavy Structures Laboratory, Materials Research Laboratory, Smart Structures and Dynamics Laboratory, Structural Analysis Laboratory, Structural Simulation Laboratory, Advanced Dynamics Laboratory, Construction Technology Laboratory and Construction Simulation Laboratory and Multi-Hazard Protective Structures Laboratory. This laboratory cluster has facilities to test material strength and prototype structures. Some of the key equipment includes strain controlled dynamic compression testing machine (4000 kN), MTS actuator, mercury intrusion porosimeter, atomic force microscope, corrosion testing facilities, portable dynamic shaber, high tech data logging systems and special interrogation systems for structural health monitoring based on smart piezoelectric sensors. It houses fire furnace (1300° C) with universal testing machines. In addition, it has state-of-the art shake table and large strong floor for conducting destructive tests on large specimens.

Computational Laboratory is equipped with two Xenon Servers with Windows 2003 server Edition, for domain control and as license server, 50 core 2 Duo/Quad systems with 4GB of RAM and Windows 7 Enterprise Operating System. All the systems are connected to IITD LAN through Gigabit switches. The laboratory is equipped with some of the latest software viz. Microsoft Office 2010, Microsoft Office projects 2007, ArcGIS V10.0, Bentley Civil Engineering Software including STAAD pro V8i, Microstation, MX Road, WaterGEMS, SewerGems, StormCAD, Matlab V2012a, Abaqus V11.0, Ansys V14.0, Plaxis 2D, RocScience, GeoStudio V2007, SAP2000 V15, Etabs V9.0, SAFE V14.0, SAFIR etc. The laboratory is also equipped with a 3000 ANSI Lumens LED Projector mounted on the ceiling for conducting computer-aided tutorial classes and presentations. The laboratory has been equipped with PA system comprising of wired and wireless microphones and 6 speakers connected through a Digital Amplifier and a 12 Channel Mixer.

Soil Mechanics Laboratory has facilities for testing soils under generalised stress-strain conditions (universal triaxial cell), under high confining pressures (up to 1400 kg/cm²), in large size specimens (100 mm diameter), and under partially saturated conditions. Computer controlled GDS triaxial test system is available. It has equipment for measurement of electric resistivity, thermal conductivity, testing soils under dynamic conditions, etc. and for model tests. Equipment to carry out field investigations by drilling boreholes, standard penetration tests, collection of undisturbed samples, plate load tests, dynamic cone and static cone penetration tests are available. A specially built tank 7x3x3 m. with a reaction frame of 40 ton. capacity to test prototype models of retaining walls (active and passive conditions), bridge abutments, geotextile reinforced walls, pile foundations, and footings; to study

the thermal conductivity of soils, stability of model submarine pipelines, pullout behaviour of model anchors and skin friction behaviour of model piles. Facilities have been developed for the assessment of strength and friction behaviour, hydraulic behaviour, construction serviceability of geosynthetics (both natural and polymeric). Soil dynamics testing facilities include SASW for soil profiling, block vibration test, dynamic pile load test etc. MASW Shear wave velocity field testing apparatus, Geosynthetics test equipment for pullout, interface and sliding.

Rock Mechanics Laboratory has facilities to test intact rocks and jointed rock masses; to model and test the modelled materials. The laboratory has the following equipment : a loading frame (500 ton vertical load, 100 ton lateral load) to test up to 70x70x70 cm. Specimens, with system for monitoring cell pressures and volume changes, loading and unloading sequences, biaxial and triaxial testing unit (up to 1400 kg/cm²), triaxial (200 kg/cm²), oblique shear and double shear equipment, strain indicators, sonic wave velocity apparatus, borehole extensometer, core drill cutting and lapping machines. Laboratory extensions exist to study the foundations of dams, tunnels and strata control problems with 100 channel data logger.

Transportation Engineering Laboratory has facilities to test aggregates, bituminous materials, bituminous mixes as well as soils. Digital Master Loader with the ability to test marshal and CBR specimens, connected with the data logger : Video Image processing system, Digital Video Camera : Software MX-ROADS, CUBE. The laboratory is also equipped with accelerated polishing equipment, skid resistance tester, automatic vehicle counting devices, etc. Pavement evaluation by Profilograph, Roughometer and Benkelmann beam apparatus. Traffic data collection system (miovision), Rut tester, Dynamic shear rheometer.

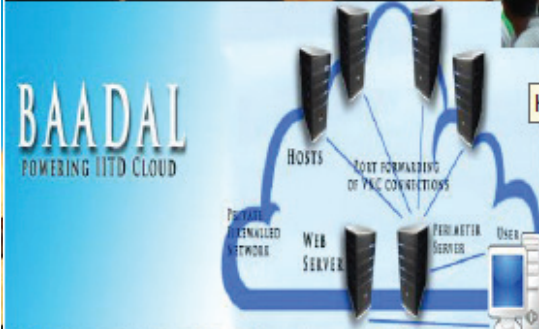
Environmental Engineering Laboratory is equipped to examine water and wastewater chemically, physically, bacteriologically and biologically. Filtration columns, pilot scale rotating biological contactors, mini ion exchange plant, Simulated landfills, cold model re-circulating fluidized bed reactor, etc. are available for conducting research. It has the facilities of a constant temperature room and a dark room with a microbiological camera. An advanced instrumentation room houses modern equipments e.g. GCMS, AAS, HPLC, microprocessor based UV 2000 spectrophotometer, TOC Analyzer, digital gas liquid chromatograph, Dedicated microbial quality facility, digital electronic ion analyser, flame photometer, Digital Balance, Microbalance, digital microprocessor based DO and Ion meter, digital pH controller, indoor air quality monitor, air velocity meter, handy air samplers, respirable dust monitors, Bio-aerosol Sampler, Stack monitoring kit, Indoor air quality chamber, Bomb calorimeter and many other allied analytical equipments for the analysis of water / wastewater / air / organics / inorganics / metals. Besides, flue gas analyzer, RSPM Monitor for monitoring PM10 and Impactor based PM 2.5 monitor, multi-stream cyclon based monitor, Ozonator and Weather station are available.

Surveying and Remote Sensing Laboratory is equipped with precise survey instruments for field surveying like Total Station, GPS, Digital & Auto Level, etc. Precise angle measuring equipment measuring upto 1" and electronic distance measuring equipment of accuracy 1:50,000 are also available.

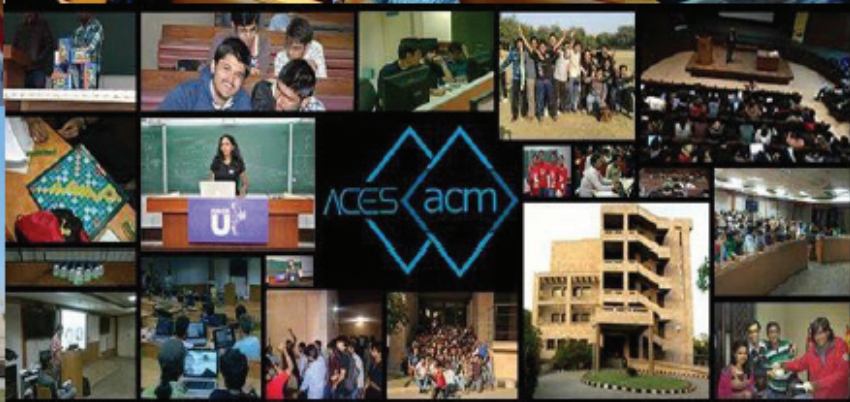
Engineering Geology Laboratory is equipped for research work in the field of geochemistry, geophysics and industrial mineralogy, qualitative assessment of minerals for hydroelectric projects can be carried out. Data base is available for preparing landuse map of any area in India. PCs with large variety of softwares are available to process the geological data. There is a good geological museum with large collection of minerals, rocks, fossils and models.

Water Resources Simulation Laboratory has two components. The laboratory is equipped with latest computational tools available in the area of Water Resources. The laboratory is equipped with 35 core2 Duo and i7 processors, LAN facilities for satellite image processing and application softwares dealing with ARCGIS and Expert System (LEVEL 5 OBJECT). Experimental facilities include Advanced Hydrologic System, Hydraulic Work Bench, Spectrophotometer: Ion Meter and other instruments for carrying out a detailed water quality analysis. River Hydraulics Facility in the form of two flumes enables model studies; sediment transport analysis, dam break and flood wave propagation studies. Bench scale test facility for slurry transportation pipeline systems is also available.





http://www.cse.iitd.ernet.in/projects_website/data/1.jpg



ROSHNI INDOOR NAVIGATION SYSTEM FOR VISUALLY IMPAIRED



Waist Module



Wall Module



Users Navigating with Roshni



Mobile Application

Department of
Computer Science & Engineering



Saroj Kaushik, Ph.D. (IIT Delhi)
Professor
Artificial Intelligence, Location Based Services.

Head of the Department



Amitabha Bagchi, Ph.D. (Johns Hopkins Univ.)
Associate Professor
Structural properties of Nnetworks, Algorithms, Data Structures

Rahul Garg, Ph.D. (IIT Delhi)
Professor

Machine Learning, Big Data Analytics, Neuroimaging, High Performance Computing.



M. Balakrishnan, Ph.D. (IIT Delhi)
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CAD for VLSI, Computer Architecture.

Shyam Gupta, Ph.D. (IIT Delhi)
Professor
Graph Theory, Databases.



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Computer Vision, Real-Time Systems, Robotics.

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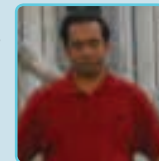
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Professor
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S. Arun Kumar, Ph.D. (TIFR, Bombay)
Professor
 Semantics and Verification.



Subodh Kumar, Ph.D. (Univ. of North California)
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 Computer Graphics, Visualization, Geometry.



Mausam, Ph.D. (Washington, Seattle)
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 Artificial Intelligence, Natural Language Processing.



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 Embedded Systems, CAD for VLSI.



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 Reconfigurable Computing, Embedded Systems.

Sanjiva Prasad, Ph.D. (Stony Brook Univ.)
Professor
 Programming Languages,
 Concurrent Systems.



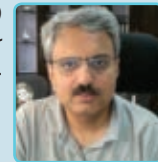
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Huzur Saran, Ph.D. (Univ. of California, Berkeley)
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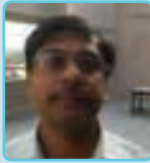


Smruti Ranjan Sarangi, Ph.D. (Univ. of Illinois)
Assistant Professor
 Computer Architecture, Operating Systems.



Aaditeshwar Seth, Ph.D. (Waterloo Univ.)
Assistant Professor
 Computer networks, Social Network Analysis.





Sandeep Sen, Ph.D. (Duke University)
Professor
 Computational Geometry,
 Algorithms.

Anupam Joshi, Ph.D. (Purdue University)
Visiting Professor
 Intelligent Networked Systems and
 Mobile Computing.



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 High Performance Computing, Concurrency,
 Formal Verification.

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Emeritus Faculty
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Parag Singla, Ph.D. (Washington Seattle Univ.)
Assistant Professor
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 Artificial Intelligence.

S.N. Maheshwari, Ph.D. (Northwestern Univ.)
Emeritus Faculty
 Algorithms, Parallel Processing,
 Information Systems.



Shweta Agrawal, Ph.D. (Texas, Austin)
Inspire Faculty
 Cryptography, Information Theory.

B.N. Jain, Ph.D. (State University of New York)
Visiting Professor
 Ad-hoc Networks, Sensor Networks,
 High-speed Networks, Network Security.



Subhash Bhalla
Visiting Faculty
 New Query Languages for Web-users,
 Distributed Information Systems,
 Management of voluminous Data.

Yogish Sabharwal, Ph.D. (IIT Delhi)
Adjunct Faculty
 High Performance Computing.



S.C. Gupta
Visiting Faculty
 Software Engineering, Databases,
 Cloud Computing, Software Defined
 Storage and Networks.

INTRODUCTION

IIT Delhi has been active in Computer Science education and research since the early 1970s and the Department of Computer Science and Engineering was established in 1982. The department currently has 27 faculty members (all Ph.D. from leading institutions). This number is expected to grow in the coming years. Apart from full time faculty, the Department currently has several visiting faculty members from leading academic institutions. In the recent past, researchers from IBM, IRL also have been participating in the teaching programmes regularly.

ACADEMIC PROGRAMME

It currently offers B.Tech., 5 year Integrated Dual Degree, M.Tech., M.S. (Research) and Ph.D. programmes in Computer Science & Engineering and participates in interdisciplinary M.Tech. programmes in VLSI Design, Tools & Technology and Computer Applications. The curricula are in line with current international trends, and are also used as model curricula by other Indian universities and colleges. The current student population in the department is about 500 (250 in Undergraduate, 150 in dual degree, 70 in Masters and 30 in Doctoral programmes). Admission to the programmes is highly competitive; for the undergraduate and dual degree programmes, there is a nation-wide Joint Entrance Examination (JEE) Advanced where approximately top 150,000 students (Senior Secondary School) who cleared JEE Main appear annually and candidates only from the top 300 are offered admission to the CS programmes. Similarly, at the Masters/Ph.D. level, students with a score of 99 percentile or better in the nation-wide GATE exam are offered admission. A significant number of currently employed computer professionals and college teachers are also enrolled in our postgraduate programmes as sponsored candidates.

The emphasis of the curricula is on system architecture, algorithms, networking, machine learning, performance issues and tools for applications development. The stress is more on design, methodology, analysis and good software practices. As part of graduation requirements, undergraduate student is expected to complete a two-semester project which may involve developing a subsystem that typically contributes to fulfilling the objectives of some research project. For the dual degree and M.Tech. programme, the students are expected to undertake a project which has significant research component.

DOCTORAL RESEARCH AREAS

Parallel and Distributed computing, operating systems, Virtualization, Application specific processor synthesis, Hardware-software codesign, High Level Synthesis of Asics, Semantics, Verification, Computer Vision, Image Processing and Pattern Recognition, Machine Learning, Location Based Services, Artificial Intelligence, Natural Language Processing, Approximation Algorithms, Databases and Data-Mining, Information Security, Graph

Theory and Algorithms, Random Algorithms, Computational Geometry, High-Speed Networks, Network Based Information Systems, Multimedia Communication, Wireless Networks, Network Security, Computer graphics, 3D Animation, 3D Modeling, Virtual reality, Visualization, Combinatorial optimization, Web services and SOA, Software architecture evaluation, dynamic and static approaches to program checking, Data analytics, Social network analysis.

LABORATORY FACILITIES

Computing resources in the department include several high-end servers, server clusters, data storage systems and all of these are networked and connected to more than 150 PCs and workstations. Every faculty member, staff and Ph.D. student has a fully networked workstation with full access to the Internet and more than adequate long term storage space in the central repository. Every undergraduate and postgraduate student is also given full access to the Internet and the Department servers. Besides, all the laboratories in the Department also provide full access to the internet and to the central repository. Other major equipment includes EDA software, multi-million gate FPGA based prototyping and validation system, several Robot platforms etc. The PCs and workstations are connected through 10/100 mbp/s links. The departmental network is connected to the Institute-wide network through a 1Gbps switched fiber optic line. There is 100Mbps link to the outside world.

The major laboratories are:

General Computing Lab: This laboratory supports the general purpose computing needs of most students. It houses more than 70 workstations and provides full email and internet access. The servers provide the software required for laboratories in most of the Department courses.

Digital Hardware Design Lab: This laboratory supports the training and project needs of the students in the area of digital hardware design. Facilities include microprocessor based system design and FPGA based design.

Advanced Networking Lab: Besides providing access to ERNET and internet services, the laboratory supports development of multimedia communications and applications, ATM protocol stack, wireless and mobile communications, network, security and simulation studies in high-speed networks.

Vision & Graphics Lab: The laboratory supports development efforts in two areas, namely real-time vision and graphics. The facilities include latest graphics workstations, robot manipulators, computing clusters, virtual reality and other state of the art equipment.

Philips VLSI Design Lab: The Laboratory, established in 1996 with support from Philips Semiconductors as part of VLSI Design, Tools and Technology programme houses a state-of-the-art CAD facility consisting of several servers and workstations. P4 clients, X-terminals, plotter and VLSI design software. The CAD facility features in-house, commercial and public domain software (including Cadence and Synopsys) for VLSI synthesis and simulation.

FPGA Lab: This lab was created in 1997 to house the FPGA based design activity which started in Digital Hardware Design Lab, and grew substantially. Facilities to work with reconfigurable hardware in hardware software co-design environment have been added subsequently. The laboratory has specialized co-processor boards for implementing designs upto the complexity of six million gates.

AI & Database Lab: This Laboratory features a server supporting ORACLE and several access machines.

Verification Lab: This laboratory hosts several workstations supporting various specialized model-checking and verification tools.

Architecture, Embedded & Energy Sensitive Computing Lab: This lab state of the art workstations, and a Dell storage server for supporting research activities in high performance computer architecture and modern embedded systems.

Cyber Security Research Lab: The mandate of the cyber security lab is to carry out fundamental research in the areas of Cryptography, Computer System & Network Security and Advanced Information Systems Security. We are particularly focused on developing provably secure algorithms to meet the efficiency and security demands of emerging technology trends such as cloud computing.

Data Analytics Lab: Data analytics as a field of computer science is comparatively new and is an amalgamation of other fields such as data management, information retrieval, machine learning, natural language processing, data mining and statistics. It is concerned with consuming and processing large amounts of diverse data, including, text (HTML web pages, online books, scientific publications, etc.), structured data (for example, data residing in database systems), video, audio, etc. to derive useful insights. The current focus of lab would be on processing large scale text-data and processing large scale graphs. Open Information Extraction, Coherent Large-Scale Multi-Document Summarization, AI Applications to Crowd-sourcing, Commonsense Knowledge Extraction & Natural Language Processing over Microblogs.

Cloud Computing Lab (HIPC Lab): The lab contains infrastructure facilities for research in high-performance computing, operating system and compiler design, distributed and cloud computing.

RESEARCH

The faculty is engaged in quality research in diverse areas including Algorithms, CAD for Digital Systems, Computer Networks & Distributed Systems, Robotics, Vision and Graphics, Semantics of Programming Languages and Data Mining. In the last year itself, the department has attracted research grants in excess of Rs.25 million in diverse areas. Sponsored research projects have been carried out in many areas in the last five years. These include:

- Sensor Networks
- Computer Graphics
- Computer Vision
- Parallel Computation
- Application Specific multi-processor SOC Design
- Design Methodology for Embedded Real-time Systems
- Network and OS support for Multimedia Communications
- Network and Enterprise Security
- QoS issues in High-speed Networks
- Artificial Intelligence, NLP & Location Based Services
- Data Mining
- Information Security
- Wireless Network Architecture
- Dynamic and Static approaches for Software Checking
- Software Oriented Architecture and Web Services
- Software Verification
- Information Retrieval

Doctoral research is being carried out in:

CAD of Digital Systems: Design automation tools for VLSI, application specific instruction processor synthesis, hardware software co-design, high-level synthesis, and hardware specification and verification (associated faculty: M. Balakrishnan, Anshul Kumar, Preeti Ranjan Panda, Kolin Paul and Smruti Sarangi). (**Website: <http://www.cse.IITDelhi.ac.in/esproject>**)

Artificial Intelligence: Blackboard architecture, expert systems, natural language processing, machine learning, parallel heuristic search (associated faculty: Saroj Kaushik, K.K. Biswas, S. Banerjee, Amit Kumar, Parag Singla and Mausam).

Vision and Graphics: 2D and 3D object recognition, real-time motion tracking, image compression, image based geometric modeling, 3D graphics and animation (associated faculty: Subhashis Banerjee, Prem Kalra and Subodh Kumar). (**Website: <http://www.cse.IITDelhi.ac.in/vglab>**)

Computer Networks: Multimedia information representation, synchronization and retrieval, and interactive communications, network security, high-speed networks, sensor networks, congestion control, wireless & mobile communications (associated faculty: Huzur Saran, Vinay Ribeiro and Aaditeshwar Seth).

Theoretical Computer Science: Algorithmic graph theory, computational geometry, complexity theory, logic, semantics and algebraic theories of concurrency, randomized algorithms and approximate algorithms (associated faculty: S. Arun-Kumar, Naveen Garg, S.N. Maheshwari, Sanjiva Prasad, Sandeep Sen, Amitabha Bagchi, Amit Kumar and Ragesh Jaiswal).

Software Systems: Operating Systems, Virtualization and Cloud Computing, Parallel Computation, Concurrency, Databases, Information retrieval and extraction, Security (associated faculty: S.K. Gupta, Subodh Kumar, Sorav Bansal and Maya Ramanath).

Programming Languages and Formal Methods: Design and implementation of programming languages, program analysis, Verification of Systems and pro-Process calculi and concurrency theory, Mobile Computation models, Logics-modal, temporal Theorem Programming & type systems, Fundamentals of distributed Computing (associated faculty: S. Arun Kumar, Sanjiva Prasad, Sorav Bansal and Subodh Sharma).

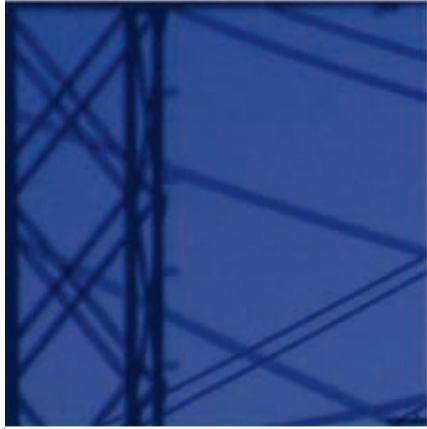
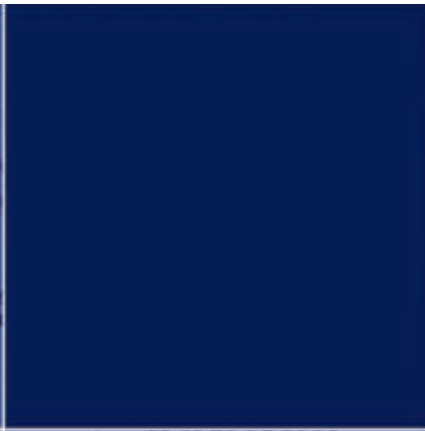


Data Analytics: Semantic web data management, opinion mining, machine learning techniques for data analysis, efficient ranked retrieval of structured data, information extraction from unstructured data, news analytics, Structure and content of online social networks, analysis of user behavior in social networks, transient social networks (associated faculty: Amitabha Bagchi, Maya Ramanath, Aaditeshwar Seth, Parag Singla and Mausam).

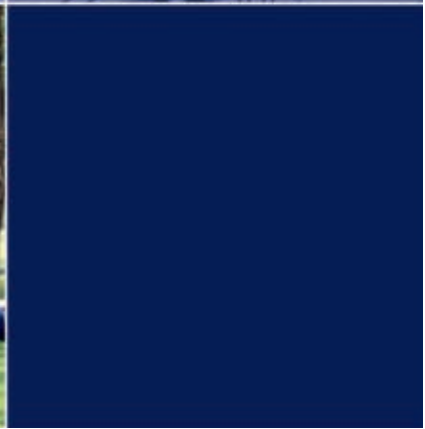
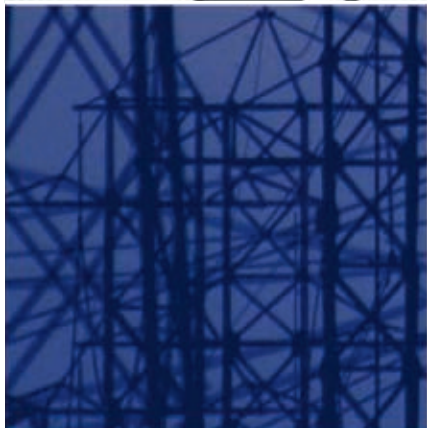
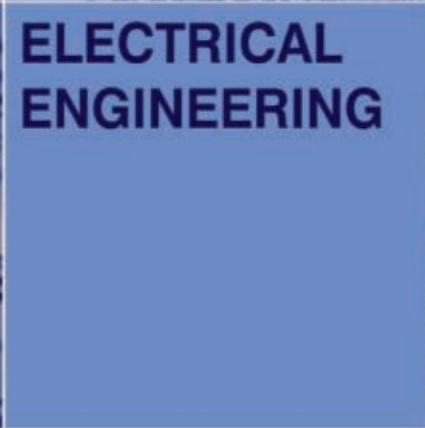
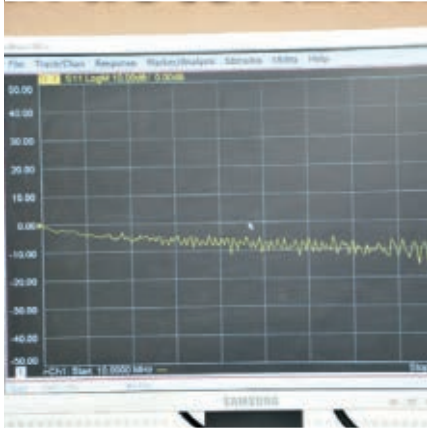
Information and Communication Technologies for Development: Rural network measurements and content distribution, ICT for health services, community radio (associated faculty: Aaditeshwar Seth, Vinay Ribeiro, Huzur Saran, Sanjiva Prasad).

Security (associated faculty: Huzur Saran, Ragesh Jaiswal and Shweta Agrawal)





DEPARTMENT OF
**ELECTRICAL
ENGINEERING**





Bhim Singh, Ph.D. (IIT Delhi)

Professor, (CEA Chair)

Power Electronics, Electrical Machines and Drives, Smart Grid Power Quality, Renewable Energy, DSP based Control of Power Converter and Drive.

Head of the Department



Abhijit R. Abhyankar, Ph.D. (IIT Bombay)

Associate Professor

Power System Restructuring Issues -Transmission Pricing, Congestion Management, Market Models; Power System Analysis and Optimization, Smart Grids.

G. Bhuvaneshwari, Ph.D. (IIT Madras)

Professor

Power Electronics, Electrical Machines & Drives, Power Quality.



Sumeet Agarwal, D.Phil. (Oxford Univ., U.K.)

Assistant Professor

Pattern Recognition, Complex Networks, Systems Biology.

R. Bose, Ph.D. (Pennsylvania Univ.)

Professor, (Microsoft Chair)

Wireless Communication, Information Theory, Error Control Coding.



Shubhendu Bhasin, Ph.D. (Univ. of Florida)

Assistant Professor

Nonlinear Control, Adaptive Control of Uncertain Nonlinear Systems, Robotics, Autonomous Systems, Reinforcement Learning Control, Approximate Dynamic Programming, Differential Games.

V. Chandra, Ph.D. (IIT Delhi)

Professor

Communication Systems, Fault Tolerant Computing Systems, Optical Communication.



Manav Bhatnagar, Ph.D. (Oslo Univ.)

Associate Professor

Signal Processing for MIMO Communication Systems, Cooperative Communications, Ultra Wideband (UWB) Communications, Non-Coherent Decoders, Cognitive Networks, Coding Theory of MIMO Communication Systems, Power Line Communication, Satellite Communications.

Shouribrata Chatterjee, Ph.D. (Columbia Univ.)

Associate Professor

Analog, Mixed - Signal and RF Integrated Circuits.



B. Bhaumik, Ph.D. (IIT Kanpur)

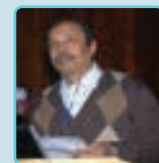
Professor

Biological Neural Networks, Analog and Mixed Signal VLSI Circuits.

S. Chaudhury, Ph.D. (IIT Kharagpur)

Professor (Dhananjoy Chair)

Computer Vision, Multimedia Systems, Computational Intelligence.





Anandarup Das, Ph.D. (IISc., Bangalore)

Assistant Professor

Power Electronics, High Power multilevel converters, Electric Drives, Modular Converters, Power Quality.



Swades De, Ph.D. (State Univ. of New York)

Associate Professor

Communication Networks and Systems, Broadband Access and mesh networks, Performance Modeling and Analysis.



Anuj Dhawan, Ph.D. (State Univ. North Carolina)

Assistant Professor

Nanomaterials, Plasmonics, Photonic devices, Biosensors, Biomedical devices, Nanofabrication, Growth and self-assembly of novel optical & electronic materials, Integrated nano-scale systems, Computational electromagnetic, Sensors: fiber-optic & Chip-based, Biophotonics and bioimaging.



Abhisek Dixit, Ph.D. (K U Leuven Belgium)

Assistant Professor

Sub-10nm logic CMOS Device Design and Characterization, CMOS variability/ reliability/thermal-effects, Aggressively Scaled CMOS embedded DRAM (eDRAM) and SRAM cells, Compact Device Modeling and Process Design Kits (PDK), Modeling and Characterization of Si Solar-cells and Modules.



Abhisek Dixit, Ph.D. (Ghent University)

Assistant Professor

Optical Networks, Fibre-Wireless Converged Networks.



Tapan Kumar Gandhi, Ph.D. (IIT Delhi)

Assistant Professor

Computational Neuroscience, Neuro-Inspired Engineering, Biomedical Signal and Image Processing, Machine Learning, Assistive Technology.

H.M. Gupta, Ph.D. (IIT Kanpur)

Emeritus Professor

Communication Systems, Computer Communications, Photonic Systems, Multimedia Information Systems.



V.K. Jain, Ph.D. (IIT Delhi)

Professor

Digital Communication, Optical Communication & Networks.



Amit Kumar Jain, Ph.D. (IISc., Bangalore)

Assistant Professor

Power Electronics, Electric Motor Drives, Renewable Energy, Automotive Electronics.



S. Janardhanan, Ph.D. (IIT Bombay)

Assistant Professor

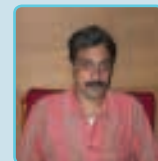
Discrete-time Systems, Sliding Mode Control, Robust Control.



S.D. Joshi, Ph.D. (IIT Delhi)

Professor

Statistical Signal Processing, Image Processing, Multiresolution Signal/Image Analysis



Jayadeva, Ph.D. (IIT Delhi)

Professor

Machine Learning, Neuromorphic Engineering, VLSI Design, Optimization, Data Analysis, Bio informatics.





I.N. Kar, Ph.D. (IIT Kanpur)

Professor

Robust Control, System Identification, Non-linear Systems, Event-triggered Control, Robotics.

R.K. Mallik, Ph.D. (Univ. of Southern California)

Professor, (Brigadier Bhopinder Singh Chair)

Communication Theory & Systems, Difference Equations, Linear Algebra.



S. Kar, Ph.D. (IISc, Bangalore)

Professor, (Ram and Sita Sabnani Chair)

Photonic Switching, Optical Networks, Computer Communication Networks, Telecom Networks Protocol Engineering, Embedded Systems.

S. Mishra, Ph.D. (Sambalpur Univ.)

Professor, (Power Grid Chair)

Power System Engineering, Intelligent Techniques for Control of Power System and Power Quality Studies, Renewable Energy.



Uday K. Khankhoje, Ph.D. (California Institute of Technology)

Assistant Professor

Computational Electromagnetics, Remote Sensing, Computational Microwave Imaging.

Bhaskar Mitra, Ph.D. (University of Michigan)

Assistant Professor

All aspects of Design and Fabrication of MEMS, Systems and Sensors.



M.J. Kumar, Ph.D. (IIT, Madras)

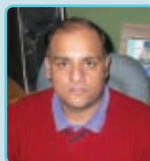
Professor

Nanoelectronics, VLSI Device Modeling and Simulation, (Power Semiconductor Devices).

Saif Khan Mohammed, Ph.D. (IISc, Bangalore)

Assistant Professor

Communication Theory, Information Theory, Statistical Signal Processing, Wireless Communication, Large MIMO Systems.



Brejesh Lall, Ph.D. (IIT Delhi)

Associate Professor

Multiscale Modeling of Stochastic Processing, Wide Scale Cyclostationary Process Representation, Physical Layer in Wireless Communication, Image Processing.

Mashuq-un-Nabi, Ph.D. (IIT Bombay)

Associate Professor

Control Systems, Guidance & Control, Computational Methods for Modeling, Simulation and Control, Finite Element Method, Distributed Parameter Systems, Flexible Structures, Electromagnetic & Coupled Systems, Electromagnetic NDT.



Ramkrishan Maheshwari, Ph.D. (Aalborg University, Denmark)

Assistant Professor

Power Electronics, Power converters, Electric Drives, Grid-connected converters, DC-DC converters.

B.K. Panigrahi, Ph.D. (Sambalpur Univ.)

Associate Professor

Power Quality, FACTS Device, Power System Protection, AI Application to Power System.





S. Prakriya, Ph.D. (Toronto)

Professor (Jai Gupta Chair)

Signal Processing for Communications,
Cooperative links, Cognitive Radio.



K.R. Rajagopal, Ph.D. (IIT, Delhi)

Professor

Electrical Machines, Electronic Vehicles, Domestic
Appliances, Drives, Motor Controllers, PM Brushless DC,
Switched Reluctance and Stepper Motors, High Efficiency
Induction Motors, FE Analysis & CAD, Magnetic Bearing,
Power Electronics, AC-CD Homes, Smart Grid Technology.



Sumantra Dutta Roy, Ph.D. (IIT Delhi)

Associate Professor

Computer Vision and Image Analysis, Music
Information Retrieval, Bioinformatics, Medical
Image & Pattern Analysis, Biometrics.



Mukul Sarkar, Ph.D. (Technical University of DELFT)

Assistant Professor

Solid State Imaging, CMOS image sensors, Bio-inspired
vision systems, Neuromorphic Imaging, Analog/Digital
circuit design, Optoelectronics and Photonics.



Nilanjan Senroy, Ph.D. (Arizona State Univ.)

Associate Professor

Power System Stability and Control, Wide Area
Measurement and Control, Statistical Techniques
in Power Systems, Power Quality.



Shaunak Sen, Ph.D. (Caltech)

Assistant Professor

Control Systems, Dynamical Systems.

Jun Bae Seo, Ph.D. (University of British Columbia,
Canada)

Assistant Professor

Wireless mobile communication networks,
Computer communication networks,
computational probability, stochastic processes,
queueing theory and optimizing network of queues.



Kushal Shah, Ph.D. (IIT, Madras)

Assistant Professor

Plasma Science, NonLinear Dynamics.



Madhusudan Singh, Ph.D. (University of
Michigan)

Associate Professor

Flexible Electronics, Maskless Lithography And Printing
Methods, Organic And Inorganic Photovoltaics,
Organic Light-emitting Diodes, Nanoscale Transport,
Sustainability, Wide-bandgap Semiconductors,
Device Design And Characterization.



Seshan Srirangarajan, Ph.D. (University of
Minnesota, USA)

Assistant Professor

Signal processing, wireless communications,
wireless sensor networks, optimisation,
machine learning.



M. Veerachary, Dr. Eng. (Japan Univ.)

Professor

Power Electronics, High Frequency Switch-Mode Power
Conversion, Fuzzy-Neuro Controllers for PE Systems, DSP
based Controllers, Object Oriented Modeling of PE Systems,
Development of MPPT Controllers for Space/Photovoltaic
Sources, Photovoltaic Power Conversion, Intelligent Controllers
for VRM's. Digital Control Theory Applications, DC-Grid.



R.K.P. Bhatt, Ph.D. (IIT Delhi)

Emeritus Professor

Adaptive Control, Nonlinear Dynamics,
Image Processing.





P.R. Bijwe, Ph.D. (IIT Delhi)
Emeritus Professor
Power Systems Analysis and Optimization,
Distribution Systems, Analysis & Optimization.



D. Chadha, Ph.D. (IIT Delhi)
Emeritus Professor
Optical Communication and Networks,
Photonics, Microwave, Electromagnetics.

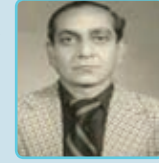


M. Hanmandlu, Ph.D. (IIT Delhi)
Emeritus Professor
Soft Computing, Image Processing, Computer
Vision, Pattern Recognition, Biometrics, Medical
Imaging, Surveillance, Intelligent Control.



U. Kumar, Ph.D. (IIT Delhi)
Emeritus Professor
Chaotic Dynamics.

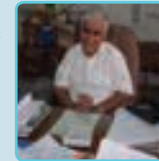
J. Nanda, Ph.D. (Moscow Univ.)
Emeritus Fellows/INSA Honorary Scientist
Power Systems Planning, Analysis, Stability,
Optimization, Computer Control, Energy
Conservation, Application of Neural Networks and
Parallel Computing to Power Systems.



R.K. Patney, Ph.D. (IIT Delhi)
Emeritus Professor
Digital Signal Processing



S. Prasad, Ph.D. (IIT Delhi)
Emeritus Professor
Signal Processing and Communication, Radar,
Sonar, Speech and Image Processing.



G.S. Visweswaran, Ph.D. (IIT Kanpur)
Emeritus Professor
CAD of VLSI, Design of Digital, Analog and
Mixed Signal VLSI Circuits.



INTRODUCTION

The department faculty are involved in teaching and research in a wide variety of areas in electrical engineering. The department offers three under-graduate programmes and nine post-graduate programmes and Ph.D. programmes.

The department offers instruction at the undergraduate and postgraduate levels with the aim of providing a sound background in the areas of electrical, electronics and computer engineering. The courses are tailored to the needs of technical manpower in the fast expanding fields of communications, computers, control, electronics and power engineering.

Apart from teaching, the department is actively engaged in research, development, technology transfer, industrial consultancy, continuing education programmes, curriculum and laboratory development, software development and organization of seminars, workshops, and conferences in related areas. The department has active interaction with industries, alumni, governmental agencies and utilities.

The department faculty actively participate with a number of interdisciplinary centres and programmes in the Institute through research, instructional activities, and human resource development projects. In particular, the department has a close interaction with Centre for Applied Research in Electronics, Bharti School of Telecom Technology and Management, the Industrial Design and Development Centre, the Centre for Energy Studies, the Centre for Biomedical Engineering, the Computer Science and Engineering Department, and the Department of Physics.

ACADEMIC PROGRAMMES

UNDERGRADUATE

The department offers B.Tech. in Electrical Engineering and B. Tech. in Electrical Engineering (Power and Automation). These two programmes with different focii provide the desired breadth and inter-disciplinary exposure to the students so that they can pursue any of the diverse areas of Electrical Engineering (e.g. Computer and embedded systems, design and fabrication of VLSI, intelligent robotic systems, cognitive and bio-inspired technologies, control systems, telecommunications and computer networking, wireless communication systems, signal and information processing, micro and nano-electronics, electromagnetic and electrochemical systems, power engineering, renewable energy, electrical transportation systems, green technologies etc.) either in an industry-based or research-based career.

The B. Tech. programme in Electrical Engineering (Power and Automation) concentrates on automation technologies and power engineering catering to the current needs of intelligent and effective energy management. Students of this B.Tech. Programme also have an option of specializing in specific areas by doing additional courses.

POSTGRADUATE

The department offers M.Tech., M.S. (Research) and Ph.D. programmes in Electrical Engineering.

(I) M.Tech.

The department offers six specialized postgraduate programmes leading to an M.Tech. degree:

- Communication Engineering.
- Computer Technology.
- Control and Automation.
- Integrated Electronics and Circuits.
- Power Systems.
- Power Electronics, Machines and Drives.

In addition, the department jointly conducts industry sponsored interdisciplinary M.Tech. programmes specializing in:

- Opto-electronics and Optical Communications (jointly with Physics Department).
- VLSI Design, Tools and Technology (VDTT) (jointly with the Centre for Applied Research in Electronics and the Department of Computer Science and Engineering).
- Construction Technology and Management (jointly with the Civil & Mechanical Engineering Departments).
- Telecom Technology and Management through the Bharti School of Telecommunication Technology and Management (jointly with the Department of Management).

The full-time M.Tech. programmes are normally of four semesters duration. The department has recently introduced a six semester (three year) M.Tech. programme, with enhanced scholarship. The students enrolled in this three year programme help in the development and maintenance of existing and upcoming laboratories. This gives them an opportunity to develop hands-on experience with state-of-the-art facilities.

(II) M.S. (Research) Programme

The M.S. (Research) programme is appropriate for those wishing to pursue a career in research and development in the industry or for those pursuing a career in teaching. Unlike the students in the M.Tech. programme, the M.S. (Research) students are required to do a more exhaustive research project, and credit fewer number of courses.

RESEARCH AREAS

The department offers a Doctoral programme with a view to push the frontiers of knowledge and to explore new and emerging areas. Teachers in engineering colleges are particularly encouraged to enroll for the Ph.D. programme. The various research activities are coordinated by different research groups within the department. These groups also represent a broad classification of the research interests of the faculty. The different research areas covered by these groups are given below.

Communication Engineering Group

Performance Analysis of Communication Systems, Cooperative Communications, Cognitive Radio, Information Theory and Coding, Communication Networks, Secrecy & High speed wireless and wireline communications, MIMO, Image / Video coding, Multirate Signal Processing, Optical Communication and Networks, FSO, Micro and nano photonics, Photonics & Switching, Electromagnetics, Plasmonics & Plasma science, Molecular communications.

Computer Technology Group

Computer Vision, Multimedia Systems, Image Processing, Computer Networks, Computer Architecture, Embedded Systems, Parallel Computation, Neural Computation, Pattern Recognition, Artificial Intelligence, Music Information Retrieval, Bioinformatics, Machine Learning, Biometrics.

Control Engineering Group

Robust Control, Intelligent Control, Robotics, Optimal Control, System Identification, Reinforcement Learning Control, Nonlinear Systems and Control, DYNAMICAL SYSTEMS, Adaptive Control, Cooperative Control and Path Planning, Sensor Fusion, Guidance and Navigation, Sliding Mode Control, Interval Analysis in Control Design, Computational Methods for Simulation and Control, Modeling and model order reduction, Attitude Control and Structural Control, Numerical Modeling and Simulation, Embedded Control Systems, APPLICATIONS TO BIOMOLECULAR CIRCUITS.

Integrated Electronics & Circuits Group

Adaptive self-powered systems for healthcare and environment monitoring. Circuits, Devices and Systems, VLSI Design and CAD, Microelectronics, Digital Signal Processing, Neural Networks, Biological Neural Networks for Vision, Information Technology, Chaos, Microprocessors, Computational Neuroscience and Analog VLSI Design, RF CMOS Integrated Circuits, Mixed Signal Circuits.

Power Engineering Group

Electrical Machines, Energy Conversion, Power Electronics, Power Quality, Drives, Power and Energy Systems, Protection, Stability, Optimization, Energy Conservation, HVDC and FACTS, Applications of Microprocessors and Computers in Power and Drives, Renewable Energy Systems (Small Hydro, PV, Wind), and Energy Audit and Efficiency, Solar Inverters and Power Supplies.

LABORATORY FACILITIES

The Department maintains a library, a departmental workshop, and an ergonomically designed committee room equipped with video conferencing facility. The department has well equipped laboratories with extensive hardware and software facilities for teaching and research in the areas of basic Electrical Engineering, Measurement, Communications, Microwaves, Integrated Optics, Signal and Information Processing, Optical Communications and Optical Signal Processing, Computer Technology, Computation, Multimedia and Distributed Computing, Robotics and Distributed Control, Microprocessor Development Systems, Microprocessor Applications, Control and System Engineering, Process Control, Electronic Circuits and Networks, Electrical Machines and Drives, Power Systems, Power Electronics, VLSI Design, Electrical Energy Audit and Energy Conservation, Electrical Machines, and Energy Instrumentation. Most electronic experiments within a frequency limit of 40GHz, can easily be conducted in the laboratory facilities of the department.





DEPARTMENT



OF



HUMANITIES
AND
SOCIAL
SCIENCES





Ravinder Kaur, Ph.D. (Delhi Univ.)

Professor

Social Change, Sociology of Development, Gender, Kinship, Anthropological Demography, Environment, Sociology of India.

Head of the Department



Ankush Agrawal, Ph.D. (IGDR, Mumbai)

Assistant Professor

Development Economics, Applied Econometrics.

Divya Dwivedi, Ph.D. (IIT Delhi)

Assistant Professor

Philosophy of Literature, Aesthetics, Narrative Theory, Literary Theory, Gandhi Studies, Political Cartooning.



Vibha Arora, Ph.D. (Oxford Univ.)

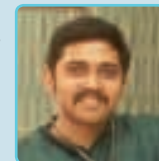
Associate Professor

Political Sociology, Environmental Sociology, Sociology of Development, Globalization and Transnationalism, Visual Anthropology, Medical Anthropology, Gender and Development, Social research Methods, Sociological Theory, Sociology of South Asia, the Himalayan Region and their Diaspora.

Arjun Ghosh, Ph.D. (Jawaharlal Nehru Univ.)

Assistant Professor

Culture Studies, Performance Studies, Authorship, Intellectual Property.



Bijoy H. Boruah, Ph.D. (Guelph Univ.)

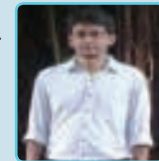
Professor

Philosophical Aesthetics, Philosophy of Mind, Ethics and Value Theory.

Samar Husain, Ph.D. (IIT Hyderabad)

Assistant Professor

Human Science Processing, National Language Parsing, Natural Language Modeling, Dependency Grammars.



Arudra Burra, Ph.D. (Princeton University, USA)

Associate Professor

Moral, political, and legal philosophy.

Farhana Ibrahim, Ph.D. (Cornell Univ.)

Associate Professor

Sociology of India, Nationalism and the Nation, State, Sociology of Religion, Historical Anthropology, Medical Anthropology, Migration, Kinship, Qualitative Research Methods.



Pritha Chandra, Ph.D. (Univ. of Maryland)

Associate Professor

Linguistics, Theoretical Syntax, Language Acquisition (1/2nd), Politics of Language.

Stuti Khanna, D. Phil. (Oxford Univ.)

Assistant Professor

Modernism, Postcolonialism Twentieth-Century Literature, Indian Writing in English, Cities and Gender.





Reetika Khara, Ph.D. (Delhi School of Economics)
Associate Professor
 Economic Development, Education, Health and Nutrition, Indian Economy.



Richa Kumar, Ph.D. (Massachusetts Institute of Technology)
Assistant Professor
 Sociology of Agriculture, Sociology of Development, Science and Technology Studies (STS), Science and Technology Policy, Agriculture and Rural Development Policy, ICTs and Development.



Debasis Mondal, Ph.D. (ISI, Kolkata)
Assistant Professor
 International Trade, Economic Growth, Public Economics.



Angelie Multani, Ph.D. (Jawaharlal Nehru Univ.)
Associate Professor
 Indian Theatre in English, Culture Studies, Gender/Studies, Contemporary Fiction.



Rukmini Bhaya Nair, Ph.D. (Cambridge Univ.)
Professor
 Linguistics, Philosophy of Language, Cognitive Science and Cultural, Studies, Critical Theory, Postcolonialism, Gender, Creative Writing, Narratology.



Sourabh B. Paul, Ph.D. (University of British Columbia)
Assistant Professor
 Labour Economics, Empirical Development, Trade Policy, R&D and firm productivity, Technology spillover and labour market effects, Health and Nutrition, Household Behaviour Analysis, Crime and Inequality, Applied Microeconomic Theory.

Bharati Puri, Ph.D. (Jawaharlal Nehru Univ.)
Associate Professor
 Buddhism Tibetan/Himalayan Studies, Philosophy of Culture, Social & Political Thought, Anthropology and Philosophy, Applied Ethics Literature and Philosophy, Peace Studies, Philosophy and Literature, Sufi Thought.



Rajkrishnan Rajkumar, Ph.D. (Ohio State Univ., USA)
Assistant Professor
 Natural Language Generation (NLG), Syntactic theory and Psycholinguistics.



Ambuj D. Sagar, Ph.D. (Massachusetts Institute of Technology)
Professor
 Energy & Environment Policy, Energy Innovation Policy, Climate Change Policy, S&T Policy, Technology & Development.



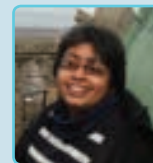
Sanil V., Ph.D. (IIT, Kanpur)
Professor
 Philosophical investigations into Art, Science, Technology, Literature and Social Sciences, Reason and Revolt, Violence, Hate and Revenge, Contemporary Indian thought, Intellectual traditions of Kerala, Philosophy of Biology.

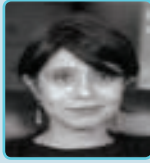


Sarbeswar Sahoo, Ph.D. (National Univ. Singapore)
Assistant Professor
 Postcolonial State, Civil Society and Democratization, Adivasis of India and the Politics of Development, Hindu Nationalism, Neo-liberal Globalization and Social Inequality, Sociology of Religion and (Anti-Christian) Violence.



Paroma Sanyal, Ph.D. (English and Foreign Languages University, Hyderabad)
Assistant Professor
 Phonology and Syntax, Theoretical Frameworks: Optimality Theory, Lexical Phonology, Distributive Morphology, Minimalism, Minor Research area Language teaching: English Language teaching, Task-based language teaching.





Simona Sawhney, Ph.D. (University of California)

Associate Professor

South Asian Language and Literature, Postcolonial Literature and Theory, Sanskrit Literature, Literary Theory.



Upasna Sharma, Ph.D. (IIT Bombay)

Assistant Professor

Climate Change, Disaster Management, Hazard Early warning Systems, Index-Based Agricultural Insurance, Traditional Knowledge Systems for Weather Prediction, International Negotiations on Climate Change.



Kamlesh Singh, Ph.D. (Univ. of Rajasthan)

Associate Professor

Positive Psychology, Applied Positive Psychology, Environmental Psychology, Psychometrics, Community Psychology, Rural Women and Adolescents.



Purnima Singh, Ph.D. (Allahabad Univ.)

Professor

Social and Applied Social Psychology, Justice, Identity, Inter Group Relations, Cognition and culture.



Varsha Singh, Ph.D. (IIT Bombay)

Assistant Professor

Behavioural Decision Making and Choice Behaviour, Dual process theories of decision making, Heterogeneity and constraints in decision making.



Saptarshi Mukherjee, Ph.D. (ISI, Delhi)

Assistant Professor

Mechanism Design, Social Choice and Game Theory.

Naveen Thayyil, Ph.D. (Tilburg University)

Assistant Professor

Law, Techno-science and Democratisation, Regulatory issues in new and radical technologies, Democratisation of regulation of technology, Risk regulation, Use of ethics in technology regulation, Development of Technologies and Public contestations, Public participation in regulation.



Jayan Jose Thomas, Ph.D. (IGDR, Mumbai)

Associate Professor

Labour, Capital and Technology in Indian Industrialization.



C.A. Tomy, Ph.D. (Univ. of Hyderabad)

Professor

Philosophy of Mind and Cognition, Philosophy of Science, Scepticism, Metaphysics and Self.



V. Upadhyay, Ph.D. (McMaster Univ.)

Professor

Development Economics, Economic Theory, Indian Economy.



Milind Wakankar, Ph.D. (Columbia University)

Associate Professor

Indian Mystical Traditions and the Modern Critique of Caste.



INTRODUCTION

The Department of Humanities & Social Sciences is an integral part of the Indian Institute of Technology Delhi. The Department houses most of the major disciplines of Social Sciences and Humanities with disciplinary and multi-disciplinary Ph.D. programmes, as well as a diverse range of Undergraduate elective courses at different levels. In addition to these, the Department also runs a Language Learning Centre for strengthening English Language skills. We also run short-term courses in French, German, Spanish and Japanese for students who wish to learn a foreign language.

ACADEMIC PROGRAMMES

UNDERGRADUATE

IITs are mandated to pursue teaching and research in science, technology and arts. IIT Delhi regards knowledge of Humanities and Social Sciences as a core value. All UG students must complete a minimum of 15 credits in HUSS courses. The courses offered for UG students are drawn from all the disciplines of the Department: Economics, Linguistics, Literature, Philosophy, Psychology, Policy Studies, and Sociology and some are also inter or multi-disciplinary. Courses are divided between 200 level and 300 level, and some advanced UG students may also choose to opt for 700 or 800 level courses, apart from doing an independent research paper in any of the HUSS disciplines.

POSTGRADUATE

We run a robust Ph.D. programme which is both disciplinary as well as inter-disciplinary. We have both a full-time as well as part-time Ph.D. programme to enable those who may be working to continue their academics. HUSS is one of the few departments that offer a genuine inter-disciplinary approach to academics that is both based on a strong disciplinary foundation and yet open to non-traditional ideas and approaches. We promote and support multidisciplinary work of the kind that is possible only when creative researchers from various disciplines are in close locational and intellectual proximity through pre-Ph.D. courses that provide a specialized disciplinary perspective as well as collaboratively taught courses which have a broader inter-disciplinary orientation. We also have Post-Doctoral positions where young doctorates are encouraged to continue their research in a supportive and intellectually exciting atmosphere.

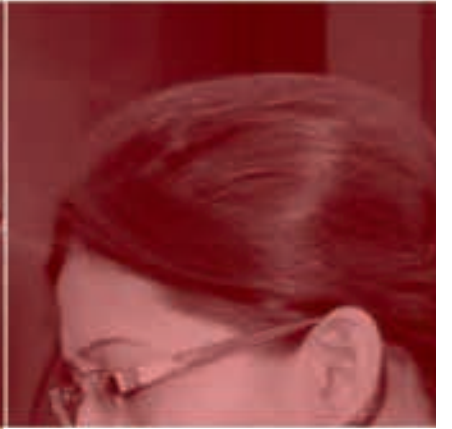
RESEARCH

Doctoral research is being carried out in : Educational Psychology Industrial and Organizational Psychology: Organizational Behavior, Human Resource Management, Social Psychology, Positive Psychology, Environmental Psychology, Cognitive Psychology; Sociology of Culture and Knowledge, Sociology of Development, Sociology of Religion, Gender Studies, Visual Sociology, Environmental Sociology, Ethnicity and Nationalism, Agrarian Studies; Economic Theory, Development Economics, International Economics, Quantitative Economics, Transport Economics, Environmental Economics, Industrial Economics, Indian Economy, Game Theory, Decision Theory, Mechanism Design; British Literatures, Theory of Criticism, Indian and Postcolonial Literatures, Performance Studies, Indian Political Thought, English Language, Linguistics, Philosophy of Language, Cognitive Studies. English Language, Linguistics, Philosophy of Language, Cognitive Studies; Epistemology, Metaphysics, Ethics, Aesthetics, Continental Philosophy, Phenomenology, Hermeneutics, Deconstruction, Law, Techno-Science and Democratization, Philosophy of Science, Technology and Social Sciences. History of Science, Sociology of Science, Technology and Society. Interface of Science and Technology with Humanities; Vulnerability and Adaption to Climate Change, Disaster Management Policy, Mitigation to Climate Change, Energy Policy.

LABORATORY FACILITY

The Department has a Language Learning Centre offering support to all first year students to enhance their language and communication skills. The Department also houses a Cognitive and Behavioural Sciences Laboratory for teaching and research in Psychology and Linguistics. A new Economics Laboratory is in the process of being set up.







Kanika T. Bhal, Ph.D. (IIT Kanpur)
(Modi Foundation Professor & Head,
Department of Management Studies)
Corporate Governance, Business Ethics,
Leadership and Culture, HRM.

Head of the Department



Harish Chaudhary, Ph.D. (IIT Delhi)
Assistant Professor
Marketing Management, Strategic Marketing,
Education Management, Product Planning &
Management and Brand Management.

P.K. Jain, Ph.D. (Delhi Univ.)
Professor

Financial Management, Management and
Cost Accounting, Corporate Restructuring and
Business Valuation.



Sanjay Dhir, FPM (IIM, Lucknow)
Assistant Professor
Strategic Management, Joint Ventures,
Innovation, Creative Problem Solving,
Technology Transfer and Strategic Alliances.

Sudhir K. Jain, Ph.D. (IIT Kanpur)
Professor

Managerial Economics, Entrepreneurship
Management & Intellectual Property Rights.



Amlendu Kumar Dubey, Ph.D. (IGIDR,
Mumbai)
Assistant Professor
Macro Economics & Econometrics.

Arpan Kumar Kar, (Fellow, XLRI)
Assistant Professor

E-Commerce, M-Commerce, Social Media,
Business Analytics and Intelligence,
Digital Marketing and Software Project
Management.



M.P. Gupta, Ph.D. (IIT Delhi)
Professor
Information System, Business Intelligence,
E-commerce and E-governance.

Smita Kashiramka, Ph.D. (BITS, Pilani)
Assistant Professor

Financial Accounting, Financial Management,
Financial Markets and Institutions, and
Corporate Restructuring.



P. Vigneswara Ilavarasan, Ph.D. (IIT/K)
Associate Professor
Information and Communication Technologies
& Development (ICTD), Information Technology
Industry in India, ICTs & Government, Social Media &
Business Practices.

Jitendra Kumar Madaan, Ph.D. (IIT Delhi)
Assistant Professor

Operations Mgmt., Supply Chain Management,
Information System, Modeling / Simulation of
Flexible/ Sustainable System, Effectiveness System
Architecture and Reverse/Green Supply Chains.





Mahim Sagar, Ph.D. (IIITM, Gwalior)

Associate Professor

Marketing, Brand Management, Ethical Brand Positioning, Product Management, Consumer Based Business Strategy, Telecom Policy and Management.



Ravi Shankar, Ph.D. (IIT Delhi)

Professor

Supply Chain Management, Operations Management, Project Management, Total Quality Management & Six Sigma, Strategic Technology Management, Quantitative modeling & Optimization, Knowledge Management.



Seema Sharma, Ph.D. (IIT Delhi)

Associate Professor

Productivity and Efficiency Analysis, Socio-economic Analysis, Energy Economics and Sustainable Development.



Surya Prakash Singh, Ph.D. (IIT, Kanpur; PDF, NUS Singapore-MIT USA Alliance)

Associate Professor

Operations Management, Manufacturing Systems, Optimization Techniques, Operation Research and Supply Chain Management, Project Management, Modelling Operations and Big Data Analytics.



Shveta Singh, Ph.D. (Allahabad Univ.)

Associate Professor

Financial Management, Security Analysis and Portfolio Management and Corporate Governance.



Shuchi Sinha, Ph.D. (Univ. of London)

Assistant Professor

Leadership development, Identity work, Workplace controls, Service work, Managing change, Workplace Spirituality.

Sushil, Ph.D. (IIT Delhi)

Professor

Strategies Management, Strategic Alliances and M & A, Flexible Systems Management, Strategic Change & Flexibility, Technology Management, Creative Problem Solving, Waste Management and Sustainability.



Surendra S. Yadav, Ph.D. (Paris Univ.)

Professor

Corporate Finance, International Finance, International Business, Security Analysis & Portfolio Management and General Management.



Jaijit Bhattacharya, Ph.D. (IIT Delhi)

Adjunct Faculty

Next Generation Governance, E-Governance, Open Technology and Applications, IT Business Modeling and Strategy.



Sanjay Patro, Ph.D. (Paris Univ.)

Adjunct Faculty

Marketing.



Vasant Dhar

Adjunct Faculty

Information Systems.



GUEST FACULTY

Dr. Sharda S Nandram,

*Associate Professor,
Nyenrode Business Universiteit, Netherlands*

Prof. S. G. Deshmukh,

Director, IIITM Gwalior

Prof. V. Upadhyaya,

Humanities & Social Sciences, IIT Delhi

Dr. A. Khurana,

Humanities & Social Sciences, IIT Delhi

Prof. M.Y. Khan,

Ex. Dean, Faculty of Business (Delhi University)

Prof. Abid Haleem,

Jamia Millia University, Delhi

Prof. Suman Modwel,

School of International Business ENPC France

Prof. Arvind Mahajan,

University of Texas, USA

Dr. Vinay Bharat Ram,

CEO, DCM Group

Prof. Stan Kachnowaski,

Columbia University

Dr. Shyam S. Sethi,

Life Time Associate, Whirlpool

Mr. Priyank Narayan,

Founder, India Preneurship and People Dynamic

Dr. K.V. Damodaran,

Joint Director, TRAI

Dr. D. Vijayrao,

DRDO

Dr. Kamlesh K. Bajaj,

CEO, Data Security Council of India

Dr. Roma Mitra Debnath,

IIPA, New Delhi

Mr. Abhishek Sharma,

Founder & CEO of Beyond Evolution Tech Solutions

Dr. Manmohan Chaturvedi,

Advisor, CISO Academy

ADMINISTRATIVE RESPONSIBILITY

Prof. Kanika T. Bhal,

Head of Department

Dr. Shveta Singh,

Coordinator, MBA

Prof. Ravi Shankar,

Coordinator, MBA (Telecom)

Dr. Sanjay Dhir,

Coordinator, Executive MBA

Dr. Surya Prakash Singh,

Coordinator, MBA Admission

Dr. Smita Kashiramka,

Coordinator, Ph.D. Admission and Time Table Incharge

INTRODUCTION

The Department currently runs three MBA programs: a two-year full-time MBA programme, a two-year full-time MBA programme with focus on 'Telecommunication Systems Management' under the aegis of Bharti School of Telecom Technology and Management and a three-year Executive MBA programme with focus on 'Technology Management'. Department offers functional area specialization in Finance, Marketing, Information Systems, Strategy, Organisation Management, Human Resource etc. The students in two-year full time MBA programme are admitted through a rigorous screening process of CAT (Common Admissions Test)*, Group discussion and Personal interview.

Department of Management Studies (DMS) has heavy research orientation as its forte, which is further used extensively for designing courses to respond to the current industry issues. The course content is very contemporary and has involved various stakeholders including industry experts, CEOs and our alumni. DMS faculty who have served on various UN related bodies and international professional association are widely acclaimed internationally for their contributions in knowledge generation and research publications. Stanford has ranked DMS 2nd for its research output among IIMs and IITs. The faculty members are sought after nationally and internationally for consulting activities and research projects and has been widely acclaimed for their contributions. Till date in more than three decades of existence, over 80 PhDs have been groomed by Department. The faculty has contributed at the highest policy level committees of Government of India (Gol), served on various boards of corporate entities, as Chairman 'All India Board of Management Education' of AICTE and contributed to the establishment of 5th Indian Institute of Management (IIM) at Kozhikode; and 7th Indian Institute of Management at Shillong. The Department faculty has published over 70 books and over 1000 papers in various 'A' category journals and conference volumes. DMS has a world class IT infrastructure with a very high faculty to student ratio. DMS has a rich software repository that facilitates computer aided instructions and enables hands on experience on leading business enterprises. The Global Field Study is an unique initiative which provides the students of DMS an international exposure through their visits to various other countries (Germany and Singapore in 2015)

ACADEMIC PROGRAMME

UNDERGRADUATE

The department offers several courses to undergraduate students as electives, and also offers a Minor Area in Management Studies.

POSTGRADUATE

The Post-graduate Program in Management at IIT Delhi has existed for nearly three decades and has carved

a niche for itself. DMS, in collaboration with the other departments of IIT Delhi, offers specialized electives to students so as to enrich their learning experience DMS offers three variants of its MBA program.

PEDAGOGY

The Department places heavy emphasis on experiential and process - oriented learning. The pedagogical tools include extensive use of Harvard case studies (HBS), simulation exercises, industry - oriented project work, eight weeks of summer projects, 3 weeks of Social Sector attributes and the like, to facilitate the same. The process – oriented learning is further enhanced by Global Field Studies (GFS) which students undertake for their projects. Besides honing up the skills of individual decision-making, enough emphasis is laid on developing team skills and value focused decision making. The compulsory audit courses are designed for this purpose. Extensive research and consultancy that have gained wide peer level recognition back the teaching.

Masters in Business Administration

With the unique features of systems orientation and a blend of creativity and analytical problem-solving skills, MBA Full Time is aimed to develop holistic managers who internalize a synthesis of conventional and modern management – thinking and who can comfortably adapt to changing business requirements. The program provides the students with various routes to the industry, matching its requirements with their skills and predispositions. Every student gets the opportunity to take courses in major-streams: Information Systems, Finance, Marketing, Strategic Management and Operations Management. Along with the functional areas of specialization, the students also get a cross functional perspective.

MBA (Telecommunication Systems Management)

The MBA Full Time Program with focus in Telecommunication Systems Management is a hallmark of techno-managerial excellence imparted to the scholars at DMS. This programme is comprehensive in nature, involving all the business functions – Information Systems, Finance, Marketing, Strategic Management, Human Resources Management, with an emphasis on Telecommunications Systems Management, which provides a strong foundation in Telecom Technology, Business and Regulation. This programme draws Telecom technology inputs from Bharti School of Telecom Technology and Management of IIT Delhi. The inclusive nature of the program fosters creation of effective managers across different domains, equipping them with holistic skills and a strategic advantage when it comes to leading business in the Telecom sector.

Executive MBA - 3 years MBA in Technology Management

For the Indian industry to gain global competitiveness, effective management of technology is crucial. This would mean using technology as a strategic variable to gain competitive advantage and would require an organization to critically understand processes of technology planning and strategy, management of technology transfer and absorption, and more. The Executive MBA programme with focus on 'Technology

Management' is aimed at fulfilling these requirements so as to enable the managers to effectively contribute in evolving core competencies in Indian industry. This programme is designed to impart management education to working executives.

RESEARCH

The Department of Management Studies has a full-fledged Ph.D. programme in Management. With its liberal multidisciplinary approach, the department provides excellent ambience for research amidst the world class infrastructure at IIT Delhi. In a 2015 Stanford study on Indian Universities doing research in social science, the Department of Management Studies, IIT Delhi has been ranked second in the Business and Management category. Surpassed only by IIM Bangalore, DMS is ahead of all other IIMs, IITs and ISB.

The research areas are broadly classified into the following areas: Economics; Finance & Accounting; Information Technology & Systems; Marketing; Operations, and Supply Chain Management; and Strategy, and Technology Management.

Specific research and teaching interests of the department include:

Global strategy & strategic alliance; Knowledge management; Flexible systems Management & planning of service systems; Technology Management; Systems approach to waste management & productivity; Business forecasting; Strategic business management; Managerial economics International economics; Economic feasibility & Techno economic analysis; Productivity & efficiency analysis; Business ethics & Innovation; R & D management; Intellectual Property Rights; Financial analysis & control; Corporate Finance; International Financial Management Derivatives; Mergers & Acquisition; Risk management; Financial analytics; Financial management of manufacturing & service sectors; Marketing management; Industrial and Hi-Tech marketing; International marketing; Industrial marketing & service marketing management; Strategic marketing; Market research; Consumer behavior; Customer Relationship Management; E-Marketing; Human resource management; Organization management; Organization behavior & Development; Leadership; Entrepreneurship management; Corporate Entrepreneurship; Logistics & Supply chain management; Operations Research; Manufacturing systems management; Project management; Product management; Enterprise resource planning; Total Quality Management; JIT operations; Business Process Re-engineering; Management of IT; System analysis & computer applications; Management Information system & Decision Support System; Business Analytics; E-Commerce; E-Governance; Information Communication Technology & Development; Social Media; Telecom Management

LABORATORY FACILITIES

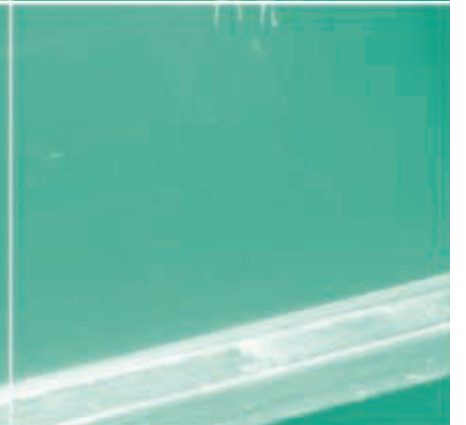
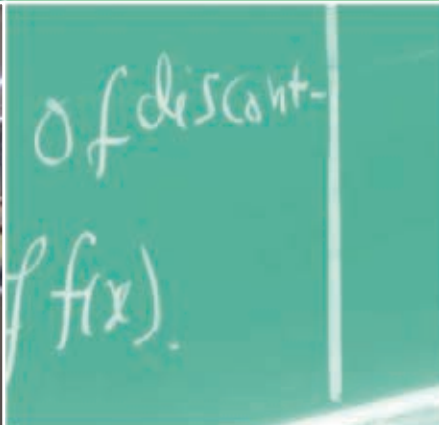
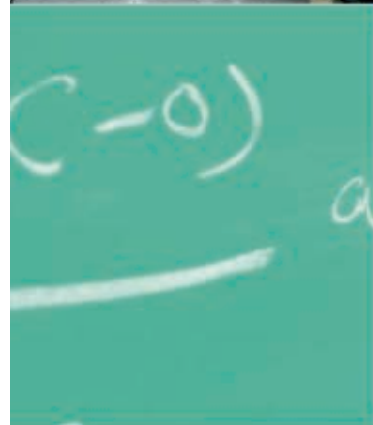
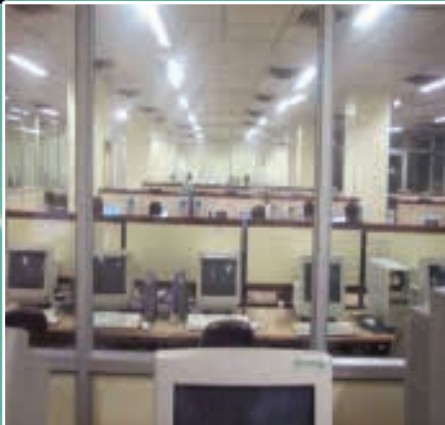
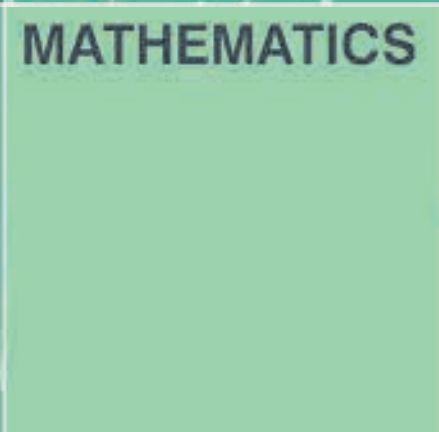
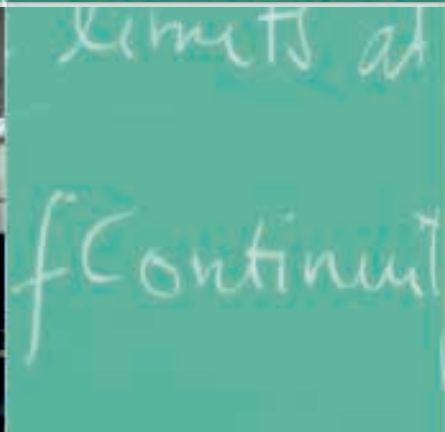
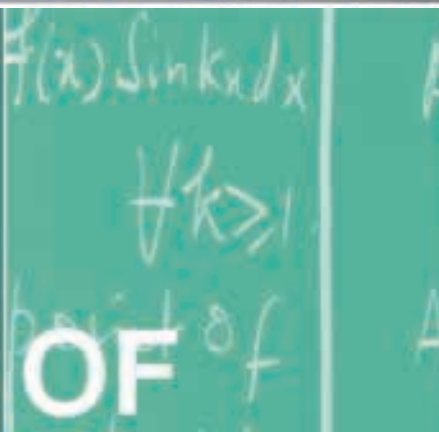
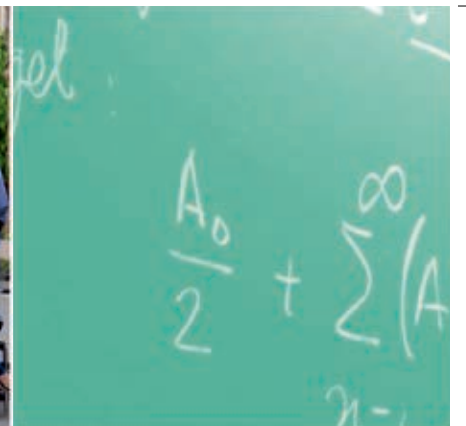
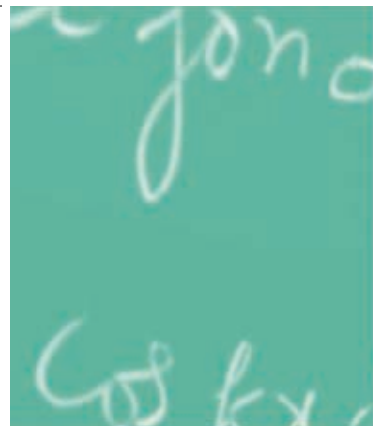
The Department of Management Studies has five fully air conditioned Wi-Fi enabled lecture theatres

equipped with LCD projectors to ensure the best possible environment for learning. The auditorium has a seating capacity of over 120 and hosts numerous guest lectures, seminars and other programmes. There is also an exclusive library in addition to the central library of the institute. The following laboratories facilitate learning and research:

- Research Lab,
- Economics Research Lab
- Marketing Lab
- Operations Lab
- Computer Lab,
- Behavioral Lab,
- Strategy and Competitiveness Lab,
- Intellectual Property Rights Cell,
- Entrepreneurship Development Cell and
- Centre of Excellence “National Centre of Business Ethics, Corporate Governance and Corporate Social Responsibility”
- Centre of Excellence in E-governance

A large collection of software packages such as SPSS, AMOS, Vensim, I-Think, Lisrd, STATA, Hummingbird Knowledge Management Suite, Prowess, LINGO, ARENA etc.) are available in the laboratories. Further, the Behavioral Laboratory has in-house camera, TV, VCR and specialized software to help the students hone their behavioral skills







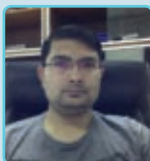
S. Dharmaraja, *Ph.D. (IIT Madras)*
Professor
Applied Probability, Queuing Theory,
Performance Modeling, Financial
Mathematics.

Head of the Department



N. Chatterjee, *Ph.D. (Univ. of London)*
Professor
Natural Language Processing, Statistical
Modeling, Semantic Web.

Aparna Mehra, *Ph.D. (Delhi Univ.)*
Associate Professor
Mathematical Programming, Fuzzy
Optimization, Financial Mathematics.



Harish Kumar, *Ph.D. (ETH Zurich)*
Assistant Professor
Computational Methods for Partial
Differential Equations.

Mani Mehra, *Ph.D. (IIT Kanpur)*
Associate Professor
Application of Wavelets to Numerical
Analysis and PDEs.



Shravan Kumar, *Ph.D. (Madras Univ.)*
Assistant Professor
Abstract Harmonic Analysis.

Anima Nagar, *Ph.D. (Gujrat Univ.)*
Associate Professor
Topological Dynamics.



V.V.K. Srinivas Kumar, *Ph.D. (IIT Kanpur)*
Assistant Professor
Computational Partial Differential Equations.

B.S. Panda, *Ph.D. (IIT Kanpur)*
Professor
Algorithmic Graph Theory, Graph Theory,
Algorithms, Parallel and Distributed Computing.



Subiman Kundu, *Ph.D. (Virginia Tech. Univ.)*
Professor
Topology, Measure Theory.

Amit Priyadarshi, *Ph.D. (Rutgers Univ.)*
Assistant Professor
Fractal Dimensions, Positive Operators.





S.C. Sekhara Rao, *Ph.D. (IIT, Kanpur)*
Professor
Parallel Computing, Numerical Analysis.



Sivananthan Sampath, *Ph.D. (IIT Madras)*
Assistant Professor
Applied Harmonic Analysis, Inverse Problems,
Learning Theory.



Ritumoni Sarma, *Ph.D. (TIFR, Bombay)*
Assistant Professor
Algebraic Groups.



R.K. Sharma, *Ph.D. (IIT Delhi)*
Professor
Algebra, Cryptography.

K. Sreenadh, *Ph.D. (IIT Kanpur)*
Associate Professor
Differential Equations and Analysis.



A. Tripathi, *Ph.D. (Univ. at SUNY, Buffalo)*
Professor
Number Theory, Combinatorics and Graph
Theory.



Viswanathan Puthan Veedu, *Ph.D. (IIT Madras)*
Assistant Professor
Approximation Theory, Fractal Functions.



INTRODUCTION

The Department offers courses at both undergraduate and postgraduate levels. It runs a five year dual degree programme (B.Tech. + M.Tech.) in Mathematics and Computing, a four year B.Tech. programme in Mathematics and Computing, and a two year M.Sc. programme in Mathematics. The Department also has an active Ph.D. programme.

ACADEMIC PROGRAMMES

UNDERGRADUATE

The Department offers a five year dual degree programme (B. Tech. + M. Tech.) in Mathematics and Computing and a four year B.Tech. programme in Mathematics and Computing at undergraduate level. The dual degree programs have replaced former five year integrating M.Tech. in Mathematics and Computing program from 2013 onward. The aim of these programs is to build a broad based theoretical background of Mathematical Sciences and practical training in Computing, Numerical Methods, and Mathematical and Statistical Modeling. Graduate of these programs will be ready for a career in research and development in software industries, financial institutes and for a research-based career.

POSTGRADUATE

The Department offers a two-year post B.Sc. course leading to the degree of Master of Science in Mathematics. The main feature of this program is that during the first year it makes the student familiar with basic theory in all the streams of Mathematics-Pure Mathematics, Applied Mathematics, Statistics, Operations Research, Computer Science. And in the second year, the student has an option of choosing modern advanced courses in some specialized area(s).


RESEARCH

Doctoral research is being carried out in all major areas of Mathematics, Applied Mathematics, Statistics and Operation Research and Theoretical Computer Science and its application.

The major research area of the department are: Algebra, Graph Theory, Computations PDEs, Cryptography, Coding Theory, Data Mining, Partial Differential Equations, Financial Mathematics, Measure Theory, Natural Language Processing, Number Theory, Numerical Analysis, Numerical and Scientific Computing, Optimization, Parallel Computing, Topological Dynamics, Topology, Wavelets and its Applications, Harmonic Analysis, Fractals, Inverse Problems, Learning Theory.

LABORATORY FACILITIES

The Department has three well-equipped Computing Laboratories with PCs and supporting software. These Laboratories are available to students for training and implementation of their computer programmes on assignments during courses or project work.



DEPARTMENT

OF

MECHANICAL
ENGINEERING



Subir K. Saha, Ph.D. (McGill Univ.)
Professor (Naren Gupta Chair)
Robotics, Mechatronics and multi-body dynamics.

Head of the Department



S. Aravindan, Ph.D. (IIT Madras)
Associate Professor
Ceramics, Composites, Welding,
Nano-manufacturing.

Ashish K. Darpe, Ph.D. (IIT Delhi)
Associate Professor
Condition monitoring, Rotor dynamics,
Vibration.



Supreet S. Bagha, Ph.D. (Stanford Univ.)
Assistant Professor
Theoretical and experimental micro/nano-fluidics,
Electrokinetics and electrohydrodynamics, Droplet
microfluidics, Lab-on-a-Chip devices.

Naresh Varma Datla, Ph.D. (University of
Toronto)
Assistant Professor
Experimental mechanics, failure analysis,
design of medical devices, adhesion and
adhesives.



Naresh Bhatnagar, Ph.D. (IIT Bombay)
Professor
Processing and manufacturing of FRP composite
materials, Machining of traditional and
non-traditional materials, Bio-materials, Medical
implants, High strain rate composites.

Subhra Datta, Ph.D. (Northwestern Univ.)
Assistant Professor
Transport phenomena in micro- and nano-
fluidic devices for bio-separations.



Nomesh Bolia, Ph.D. (Univ. of North Carolina)
Associate Professor
Operations research, Stochastic modeling,
Data driven public policy & governance,
Transportation.

S.G. Deshmukh
Professor
Supply chain management, Quality
management, Information systems



Anoop Chawla, Ph.D. (IIT Kanpur)
Professor, (Henry Ford Chair)
CAD, CAE, Dynamics, Bio-mechanics,
Transportation & safety.

Devendra Dubey, Ph.D. (Purdue University)
Assistant Professor
Computational materials science, Biomaterials,
Nanomechanics of nanocomposite systems,
Molecular dynamics, Design for biomedical
applications, Biomimetics.





J.K. Dutt, Ph.D. (IIT Delhi)

Professor

Rotor dynamics, Vibration, Vibration control, Viscoelasticity.



Sudarsan Ghosh, Ph.D. (IIT Kharagpur)

Associate Professor

Machining and Grinding of superalloys, Composites, Nanofluid application in grinding, Fabrication of ceramics.



Amit Gupta, Ph.D. (Univ. of Central Florida)

Assistant Professor

Micro-fluidics, Multiphase flows, Lithium-ion batteries modeling and optimization.



Kshitij Gupta, Ph.D. (IIT Delhi)

Professor

Vibrations, Mechanical design, Rotor dynamics, Composite materials, Smart material Applications, Acoustics.



K. Hariharan, Ph.D. (IIT Madras)

Assistant Professor

Sheet metalforming, Plasticity and fatigue, mechanical behaviour of materials.



Harish Hirani, Ph.D. (IIT Delhi)

Professor

Bearings of all types, Synthesis and application of smart fluids, Seals.

Sanjeev Jain, Ph.D. (IIT Delhi)

Professor

Solar cooling, Heat exchangers, Microscale heat Transfer.



Sunil Jha, Ph.D. (IIT Kanpur)

Associate Professor

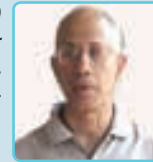
Machining and finishing processes, Micro and nano-finishing, Mechatronics, Robotics, manufacturing automation, Smart fluids.



S.R. Kale, Ph.D. (Stanford Univ.)

Professor

Heat transfer, Combustion, Fire dynamics, Fluid dynamics, Particle-laden flows.



Jitendra P. Khatait, Ph.D. (University of Twente)

Assistant Professor

Precision machine design, medical devices, Robotics.



Sangeeta Kohli, Ph.D. (IISc., Bangalore)

Professor

Heat transfer, Fluid mechanics, Biomass based technologies.



D. Ravi Kumar, Ph.D. (IIT Madras)

Professor

Metal forming, Plasticity, Materials processing.





S.V. Modak, Ph.D. (IIT Delhi)
Associate Professor

Vibration engineering, Finite element model updating, Experimental modal analysis, Vibro-acoustics, Active control of sound.



Sudipto Mukherjee, Ph.D. (Ohio State Univ.)
Professor, (Volvo Chair)

Mechanisms, Robotics, Mechanical systems design, Impact biomechanics.



Pulak Mohan Pandey, Ph.D. (IIT Kanpur)
Associate Professor

Rapid prototyping, Unconventional machining, Finite elements applications to manufacturing, CAD/CAM.



R.K. Pandey, Ph.D. (Banaras Hindu Univ.)
Associate Professor

Bearing lubrication, Design of tribological elements, Engine tribology, Lubrication in metal forming.



Sunil Pandey, Ph.D. (IIT Delhi)
Professor

Welding & fabrication technology, Production engineering, Manufacturing processes, Process engineering.



B. Premachandran, Ph.D. (IIT Madras)
Associate Professor

Heat transfer, Computational fluid dynamics.

P.V. Madhusudhan Rao, Ph.D. (IIT Kanpur)
Professor

Product design and manufacturing, CAD-CAM, Inclusive innovation.



P. Venkateswara Rao, Ph.D. (IIT Madras)
Professor

Conventional and non-conventional material removal process, Micro/Nano manufacturing.



M.R. Ravi, Ph.D. (IISc, Bangalore)
Professor

Computational fluid dynamics, Heat transfer, Renewable energy, Rural energy systems.



Anjan Ray, Ph.D. (Michigan State Univ.)
Professor

Combustion, Heat transfer.



Satinder Paul Singh, Ph.D. (IIT Delhi)
Professor (NTPC Chair)

Dynamics of rotating machinery, Composite materials, Machine design, Active vibration control, Nanomechanics.



Sujeet Kumar Sinha, Ph.D. (Pune Univ.)
Associate Professor

Tribology, Lubrication, Nano-tribology, Coatings, New tribological materials.





P.M.V. Subbarao, Ph.D. (IIT Kanpur)

Professor

Experimental turbulence, Tomography, Power generation systems and IC engines.



Prabal Talukdar, Ph.D. (IIT Guwahati)

Associate Professor

Radiative heat transfer, Heat and mass transfer in porous media, Computational fluid dynamics, Drying of food products..



T.K. Kundra, Ph.D. (IIT Delhi)

Guest Faculty

Mechanical system design, Concurrent engineering, Vibration design, CAD/CAM, Finite element model updating.



Sivathanu A. Pillai, Ph.D.

Honorary Professor

Defence and space technologies, Innovation, Creativity and leadership

A.D. Gupta, M.Tech. (IIT Delhi)

Visiting Faculty

Industrial engineering, Operations research, Value engineering, Industrial quality control.



Prem Vrat, Ph.D. (IIT Delhi)

Honorary Professor

Industrial engineering and operations management, Quality management, Value engineering, Scheduling, Maintenance and supply chain management.



Kiran Seth, Ph.D. (Columbia Univ.)

Emeritus Professor

Padma Shri
Operations research, Applied probability models, Fuzzy models.



INTRODUCTION

The faculty of the Department of Mechanical Engineering are engaged in research encompassing a wide variety of areas. Research of an inter-disciplinary nature is being performed in collaboration with faculty of other departments and centres of the institute, and with select faculty from other institutions in India and abroad. The research is largely supported by sponsored projects and consultancies. These research areas form a major portion of the topics of doctoral dissertations and Masters' theses. The research and teaching broadly covers topics in design, industrial, production and thermal engineering. A wide variety of courses in the above areas are offered by the department at all levels.

The research and teaching activities are supported by 17 skilled staff who manage 23 laboratories. Many of the laboratories are equipped with state-of-the-art facilities. The department is also host to faculty on sabbatical from Indian and foreign institutions, INSPIRE Faculty Fellows, and postgraduate and undergraduate students from several institutions/universities in India and abroad. Several faculty members serve as experts on national and international technical committees.

ACADEMIC PROGRAMMES

The department faculty offer courses at various levels catering to various degree programmes.

The offers two Undergraduate Programmes leading to the Bachelor of Technology degree with specializations in (i) Mechanical Engineering, or (ii) Production and Industrial Engineering.

The department offers four Postgraduate Programmes leading to respective Master of Technology degrees with a specialization in Mechanical Design, Industrial Engineering, Production Engineering, and Thermal Engineering. Also, Master of Science (Research) programmes are also offered in these specializations. The faculty also participate in interdisciplinary Master of Technology programmes in Construction Technology and Management, Computer Application, Polymer Science and Technology, Industrial Tribology & Maintenance Engineering, Energy Studies, and Transportation Engineering. The faculty also participate in the Master of Design programme and activities of the Khosla School of Information Technology. Recently, several faculty members have been engaged in improving rural technologies for enhanced livelihood.

Mechanical Design: Mechanical vibrations, Rotor dynamics, Damped structures, Composite structures, Smart structures, Active vibration control, Experimental modal analysis and identification, Structural dynamic modification, Finite element model updating, Dynamic design, Noise engineering, Condition monitoring, Bearing dynamics, Lubrication, Mechanical system design, Computer aided mechanical design, Computer controlled mechanisms, Vehicle dynamics, Modeling the impact of vehicles, Impact biomechanics, Concurrent engineering design, Mechanisms, Robotics, Multi-body dynamics, Application of multi-body dynamics in design, Analysis

of rural engineering systems, Mechatronics, Sensors and actuator design, MEMS, Design of micro-systems, Nano-mechanics, Artificial intelligence applications in mechanical engineering, Expert systems for design and manufacturing, Mechanical engineering applications to medical science.

Industrial Engineering: Operations research, Applied probability, Stochastic modeling and simulation, Project management, Supply chain management, Computer integrated manufacturing systems, Facilities planning, Value engineering, Flexible systems, ERP, Intelligent manufacturing systems, e-business, Quality and reliability engineering, Maintenance management, Manufacturing system design and analysis, Service system design, Production planning and control. OR applications to healthcare, manufacturing, telecommunications, transportation, policy, governance, finance, etc.

Production Engineering: Metal cutting, Metal forming, Welding, Metal casting, Material characterization, Non-traditional manufacturing processes, Measurements and metrology, Grinding of ceramics and metal matrix composites, Processing of polymers and composites, Injection moulding, Microcellular injection moulding, Finite element applications in manufacturing, CAD/CAM, Rapid prototyping, Intelligent manufacturing, Micro and nano-manufacturing, Biomaterials and medical implants, Nano-composites, Modeling of material behavior, Lean concepts in machine tool design. Magnetorheological Finishing, CNC Fishing Systems.

Thermal Engineering: Flame propagation, Flame stability, Heat transfer to/from flames, Combustion. Fire dynamics and fire safety. Internal combustion engines: alternative fuels, engine modelling and simulation, HCCI combustion in an engine. Biomass utilization, Experimental and modelling studies of gasifires, Biomass stoves, Sustainable energy systems, Energy efficient equipment and devices, Waste heat utilization, Renewable energy systems. High temperature natural convection, Cooling of electronic components, Micro-channel heat transfer, Transport phenomena in micro- and nano-fluidic devices, Heat transfer enhancement, Combined conduction-radiation problems. Heat transfer in two phase flows. Eco-friendly energy conversion, refrigeration and air-conditioning, Thermal system design and simulation. Particle-laden flows. Microfluidics, Flapping wing aerodynamics, Energy Storage, Heat Exchangers, Solar Cooling Technologies, Microscale Heat Transfer.

Interdisciplinary Research: Transportation research and injury prevention program, Energy, quality and productivity audit of rural industries, Medical implants, Autonomous robotics, Development of composite materials, Atmospheric convection, Rural Technology Action Group (Rn TAG).

LABORATORY FACILITIES

The Department has 23 well-equipped laboratories that cater to the needs of research and teaching activities. The Production Engineering, Welding, Metrology and CNC laboratories encompass the different machinery required for manufacturing and inspection. Laboratories that cater to the activities in the area of mechanical

design include: Mechatronics, Vibration and Instrumentation, Vibration Research, Mechanism and Simulation, and Design Research laboratories. Microfluidics, Combustion Refrigeration and Air-conditioning, Internal Combustion Engines, Turbo-machinery, Heat Transfer serve the needs of research and teaching in thermal engineering. Industrial engineering laboratories include Operations Research (OR), Supply Chain Management (SCM), Intelligent systems and Life Cycle Engineering laboratories. A Computer-Aided Graphics Instruction Laboratory, equipped with computers, and drawing and design software packages is used for imparting training in mechanical design. The Department also has computing clusters that cater to intensive computational activities. All major software packages are available for teaching and research. A state-of-the-art Micro-manufacturing laboratory houses sophisticated machines for micro- and nano-manufacturing.



DEPARTMENT OF
PHYSICS





B.R. Mehta, Ph.D. (IITD)(Schlumberger Chair)

Professor

Thin Film and Nanostructured Materials, Inorganic-Organic Hybrid Interfaces, Resistive Memory, Thermoelectric, Photo electro chemical and Solar Cell Devices.

Head of the Department



Sujin B. Babu, Ph.D. (Univ. du Maine, France)

Assistant Professor

Aggregation of Colloids, Porous Media, Low Reynolds Number Swimmers.

Sujeet Chaudhary, Ph.D. (IIT Delhi)

Professor

Experimental Condensed Matter Physics: Thin Films, Nano-Magnetism, Spintronics.



Varsha Banerjee, Ph.D. (IISc., Bangalore)

Associate Professor

Statistical Mechanics of Complex Spin System, Surface Growth Phenomena, Fractal Architectures and their Characterization.

Pintu Das, Ph.D. (University of Saarland, Germany)

Assistant Professor

Experimental Condensed Matter Physics- Magnetism at nanometer scale, charge carrier-dynamics (Low-frequency) as well as atomic/nanometer scale electronic phenomena in correlated electron systems, Instrumentation.



Saswata Bhattacharya, Ph.D. (IACS, Kolkata)

Assistant Professor

Computational Materials Science, Energy Conservation, Catalysis, Graphene, Genetic Algorithm, Machine learning.

Rajendra S. Dhaka, Ph.D. (UGC-DAE CSR, Indore)

Assistant Professor

Experimental Condensed Matter Physics: Electronic structure, Thin Films, Strongly correlated Systems, Surface-interface physics, High-Tc superconductors, Angle-resolved Photoemission Spectroscopy.



Mukesh Chander, Ph.D. (IIT Delhi)

Associate Professor

Electronics, Solid State Gas Sensors, Surface Characterization, Nanostructure Materials.

Joyee Ghosh, Ph.D. (Jawaharlal Nehru Univ.)

Assistant Professor

Quantum and Nonlinear Optics, Quantum Information Technologies; Atomic, Molecular and Optical Physics.



R. Chatterjee, Ph.D. (IIT Kanpur)

Professor

Experimental Condensed Matter Physics - Novel Magnetic Multi-functional Materials: Bulk and Nano/Thin Film forms

Santanu Ghosh, Ph.D. (Jawaharlal Nehru Univ.)

Associate Professor

Experimental Condensed Matter Physics, Thin Film, Ion Materials Interaction.





Sankalpa Ghosh, Ph.D. (Jawaharlal Nehru Univ.)
Associate Professor
Bose Einstein Condensate of Cold Atoms, Quantum Hall Effect, Graphene, Topological Insulator.



B.D. Gupta, Ph.D. (IIT Delhi)
Professor
Fibre-optics, Applied Optics, Fibre Optic Sensors, Plasmonics, Nano-particle Based Sensors.



Joby Joseph, Ph.D. (IIT Delhi)
Professor
Photonics, Applied Optics, Holographic Data Storage, Digital Holography, Optical Data Security, Photonic Structures.



Bhaskar Kanseri, Ph.D. (University of Delhi)
Assistant Professor
Quantum optics, Ultrafast and non-linear optics, Optical coherence and interferometry, Polarization and spectral switching.



Kedar B. Khare, Ph.D. (Univ. Rochester)
Assistant Professor
Optics/Photonics, Computational Imaging, Inverse Problems, Compressive Sensing.



Neeraj Khare, Ph.D. (BHU)
Professor
Nano-Structure Functional Oxides, Novel Magnetic Materials, Superconductors, SQUID, Solar Cells.

Ajit Kumar, Ph.D. (Moscow Univ.)
Professor
Nonlinear Fibre Optics, Few-Cycle Laser Pulses, Nano-Magnetics.



Arun Kumar, Ph.D. (IIT Delhi)
Professor
Fibre and Integrated Optical Waveguides, Components and Devices, Plasmonic Waveguides and Devices.



Sunil Kumar, Ph.D. (IISc, Bangalore)
Assistant Professor
Ultrafast Optics and Spectroscopy, Plasmonics, Electron Correlated Solids.



Brajesh Kumar Mani, Ph.D. (PRL, Ahmedabad)
Assistant Professor
Computational Condensed Matter Physics; Computational Many-Body Physics; Molecular Dynamics and Monte Carlo Simulations.



Hitendra K. Malik, Ph.D. (IIT Delhi)
Professor
Plasma Physics: Particle Acceleration, Instabilities, Fusion, Microwaves-Plasma Interaction, Solitons, Space Plasmas, THz Radiation Generation, Hall Thrusters, Plasma-Material Interaction.



Rahul Suresh Marathe, Ph.D. (RRI Bangalore)
Assistant Professor
Non-equilibrium Statistical Mechanics, Biophysics Theory, Modelling, Simulations.





Dalip Singh Mehta, Ph.D. (NPL Delhi/CCS Univ. Meerut)

Professor

Optical Coherence Tomography and 3D-Profilometry, Optical Tweezers, Optics of LEDs and OLEDs, and Quantitative Phase Microscopy.



A. Mishra, Ph.D. (Utkal Univ.)

Associate Professor

Superconductivity in Quark Matter and Ultra-cold Atoms, In-medium Hadron Properties and Observable in High Energy Accelerator Experiments.



Pranaba Kishore Muduli, Ph.D.

(Humboldt Univ. & PDI, Berlin)

Assistant Professor

Spin Torque Induced Magnetization Dynamics, Spintronics and Nanomagnetism.



Rohit Narula, Ph.D. (MIT, USA)

Assistant Professor

Condensed Matter Theory; Raman Spectroscopy.



G. Vijay Prakash, Ph.D. (Andhra Univ.)

Associate Professor

Nano-Photonics, Quantum Functional Materials, Inorganic-Organic Nano-Hybrids, Non-linear Optics.



V. Ravishankar, Ph.D. (Lehigh Univ.)

Professor

Semiconductor Physics, Devices and Technology, Organic Semiconductors, Nano-Technology.

G.B. Reddy, Ph.D. (IIT Delhi)

Professor

Thin Film Technology, Smart Windows, Nano-Structured Films.



Amartya Sengupta, Ph.D. (Rutgers Univ. & NJIT)

Assistant Professor

Experimental Ultrafast Optics, THz Spectroscopy, Optical Spectroscopy at High P-T, Mineral Physics.



P. Senthilkumaran, Ph.D. (IIT Madras)

Professor

Applied Optics, Singular Optics.



Anurag Sharma, Ph.D. (IIT Delhi)

Professor

Fiber Optics, Integrated Optics, Gradient Index Optics, Applied Optics, Numerical Modelling of Guided Wave Optical Devices.



M.R. Shenoy, Ph.D. (IIT Delhi)

Professor

Optoelectronics, Fibre and Integrated Optics, Optical Fiber Components, Nonlinear Guided Wave Optics.



A.K. Shukla, Ph.D. (IIT Delhi)

Associate Professor

Laser, Semiconductor, Raman Spectroscopy, Ion Implantation, Laser Annealing Superconductors and Nanoscience.





Rajendra Singh, Ph.D. (Jawaharlal Nehru Univ.)
Associate Professor
 Semiconductor Materials and Processing,
 Wide Band Gap Semiconductor, Semiconductor
 Nano-Wires, Semiconductor Wafer Bonding.



J.P. Singh, Ph.D. (Jawaharlal Nehru Univ.)
Associate Professor
 Nano-Structure Growth, Nano-Science,
 Experimental Condensed Matter Physics.



Aloka Sinha, Ph.D. (IIT Madras)
Associate Professor
 Nonlinear Optics, Liquid Crystals, Optical
 Information Processing, Biometrics.



R.K. Soni, Ph.D.(IIT Delhi)
Professor
 Laser Processing of Materials, Nanophotonics,
 Fluorescence and Raman Spectroscopy.

Pankaj Srivastava, Ph.D. (Rajasthan Univ.)
Professor
 Experimental Solid State Physics,
 Electronic Structure Of Materials,
 Surface-interface Physics.



K. Thyagarajan, Ph.D. (IIT Delhi)
Professor
 Optical Fibre Communication, Optical Fiber
 Amplifier and Gratings, Nonlinear Interaction in
 Optical Fibres Guided wave quantum optics.



R.K. Varshney, Ph.D. (IIT Delhi)
Professor
 Fibre and Integrated Optics, Nonlinear Optics,
 Fiber Optic Sensors, Fiber Lasers.



D.K. Pandya, Ph.D. (IIT Delhi)
Emeritus Professor
 Thin Films, Nano-Materials, Green Energy,
 Spintronics, Nano-Magnetism,
 Thin Film Solar Cells.



INTRODUCTION

The Department is engaged in cutting edge research in several areas and offers a variety of courses for undergraduate and postgraduate students. The department offers a B.Tech. programme in Engineering Physics, M.Sc. programme in Physics, and M.Tech. programmes in (i) Solid State Materials, (ii) Applied Optics, and (iii) Opto-electronics and Optical Communications (an interdisciplinary programme, jointly with the Electrical Engineering Department).

The department has well-equipped teaching laboratories, and an excellent research infrastructure. The research is broadly focused on topical areas like Condensed Matter Physics, Optics and Photonics, Plasma Physics, and Theoretical Physics. State-of-the-art research on contemporary topics like Nanoscience and Technology, Energy Materials and Devices Magnetics, Microstructured Optical Fibers, Photonic Crystals, Optical Memory, Microwave and Laser-plasma Interaction, Quantum Optics etc. is also being carried out.

ACADEMIC PROGRAMMES

UNDERGRADUATE

The department offers a variety of courses to all undergraduate students at IIT Delhi under the categories of Basic 'Science course' and 'Elective Course' requirement. The department also offers a set of specific 'Core Courses' for the undergraduate programme 'Engineering Physics'. These courses are also available to undergraduate students of other engineering disciplines as open Electives. Department offers programme linked courses to UG students of some other branches. Department also offers two minor area to UG students.

B.Tech. in Engineering Physics

The programme in Engineering Physics stresses the basic physics that underlies most developments in engineering and the mathematical tools that are important to all engineers and scientists. This emphasis, combined with hands-on-experience of working with modern computers, electronics, lasers and other equipments, culminates in an excellent preparation for a broad range of careers. There is also provision for students to opt for one of that two departmental specializations : 1) Nano-Science & Technology. 2) Photonics Technology.

POSTGRADUATE

M.Sc. in Physics

The M.Sc. (Physics) programme is designed to impart masters-level education in Physics through various lecture courses and laboratory classes. The department also offers three specializations in the broad areas of Optics & Photonics, Material Science and Theoretical Physics.

M.Tech. in Solid State Materials

The Solid State Materials programme, encompasses science and technology of materials, their synthesis, characterization and applications in devices. The programme prepares graduates to take-up challenges in research and development in Solid State Technology, Nanoscience and Technology, Material Science and Engineering, and Semiconductor Technology and Processing.

M.Tech. in Applied Optics

The Applied Optics programme, which has been running in I.I.T. Delhi since 1966 is primarily designed to emphasise the “Applied” nature of modern and classical optics. The programme is suited to the requirements of various Optical and Opto-electronic industries and R&D organisations.

Interdisciplinary M.Tech. in Optoelectronics and Optical Communication

This Interdisciplinary programme is offered Jointly by Physics and Electrical Engineering Department. This program trains students in the areas of Fiber & Integrated Optics, and Optical Communication and Networks, which are useful to various industries.

RESEARCH AREAS**Doctoral and post-doctoral research is being carried out in:**

Materials and Condensed Matter Physics: Thin Films, Materials and Devices, Novel Functional Magnetic Materials, Nanomaterials, Photovoltaics, Lattice Dynamics, Semiconductors and Amorphous Materials, Electronics Ceramics, Microwave Absorbing Materials, Microwave Processing, Quantum Functional Materials, Superconductivity, Nanomagnetism and Spintronics, Spin Dynamics, Charge Carrier Dynamics and Electronic Structure Studies of the Correlated Electron Systems, e.g., Fe-based high-Tc superconductors, Complex oxides, etc.

Optics and Photonics: Holography, High Density Data storage, Liquid crystals, Nonlinear Phase Conjugation, Optical Information Processing, Optical Data Security, Singular Optics, Nonlinear Optics, Nonlinear guided Wave Optics, Solitons, Quantum Optics, Fiber Optics, Integrated Optics, Fiber Optics Sensors and Biosensors, Fiber optics Components, Nanophotonics, Laser Spectroscopy and Applications, Terahertz Spectroscopy and Applications, Ultrafast Dynamics, Laser Processing and Fabrication, Green and Biophotonics, Photonic Metamaterials, Bio-Medical Imaging, Inverse Problems in Imaging, Optoelectronics.

Plasma Physics: Particle Acceleration, Nonlinear Waves and Instabilities in Plasma, Thermo Nuclear Fusion, Microwaves and Plasma Interaction, Solitons in Plasma, Space Plasmas, Terahertz (THz) Radiation Generation, Hall Thrusters, Interaction of Plasmas with Materials.

Theoretical Physics: Mathematical, Statistical Mechanics, and Computational Physics, Theoretical Studies in ultra-cold atoms, Nuclear Physics, Particle Physics, Ultrafast Optics. Soft Condensed Matter and Biophysics.

Computational Materials Science: Designing Energy Materials, Thermal Transport, Electronic Structure, Band Engineering, Clusters and Catalysis, Pyroelectricity, Piezoelectricity, (Anti) ferroelectricity, (Anti) ferromagnetism, Multiferroics, Spin and Lattice Dynamics, Caloric Effects, Non-collinear Magnetism, Genetic Algorithm, Machine Learning, Force Field, Density Functional Theory, Kinetic Monte Carlo, Molecular Dynamics, etc.

Interdisciplinary: Optical Spectroscopy under extreme conditions, High Pressure-High Temperature Physics, Energy Storage and alternative Energy Materials, CO₂ sequestration, Mineral Physics.

Multidisciplinary Research area: Nano- Science and Technology

A Nanoscale research Facility has been set up at IIT Delhi for developing Nanofabrication processes and their use for making nanoscale devices. In particular, the facility aims to focus on non-silicon based technologies. Over thirty five faculty members from 10 departments and centres of the Institute are involved in this programme. About 12 faculty members from physics department are actively participating in this programme.

The objective of the project is the building and demonstration of select device prototypes in seven specific Research Areas: Nanomagnetism, Nanophotonics, Nanophotovoltaics, Nanoelectronics, Nanomechanics, Biosensors, and Mesoscale Devices.

Students are trained at both the postgraduate and undergraduate levels by integrating the research done with multidisciplinary lab-oriented courses that are conducted at the facility. Research staff and Industry personnel will be trained over a period of five years by designing and conducting targeted short-term laboratory-centered courses on nanofabrication and nano-manufacturing on a regular basis.

The focus is on setting up a state of the art Nano Fabrication Facility at IIT Delhi covering all aspects of research on nano- and meso-scale devices: synthesis of nano-materials, fabrication of nanoscale devices, their characterization, analysis and applications. The facility will provide opportunity for collaboration across many departments and centres in IIT Delhi and will also be available to other institutes and industries.

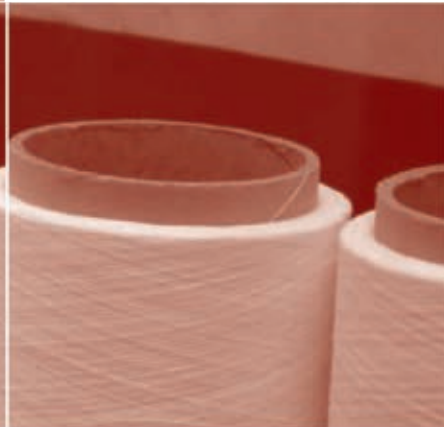
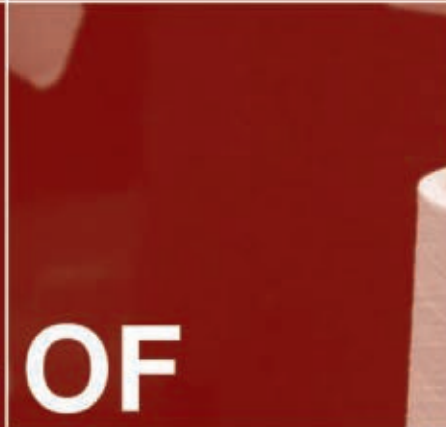
LABORATORY FACILITIES

The Department has well-equipped laboratories for both teaching and research programmes. Some of the major research laboratories are: Solid State Physics Laboratory, Thin Film Laboratory, Magnetism & Advance

Ceramics Laboratory, Nano-Stech. Laboratory, Plasma Physics Laboratory, Beam Plasma Laboratory, Fibre and Integrated Optics Laboratory, Laser Spectroscopy Laboratory, Optical Image Processing Laboratory, Quantum Electronics Laboratory. A large number of facilities are available in these and other laboratories and these include: Electron Microscopes (HRTEM, FESEM, TEM, SEM), Atomic Force Microscope (AFM), Scanning Tunneling Microscope (STM), MOKE Microscope, Scanning Auger Microprobe (SAM), Electron Spectroscopy for Chemical Analysis (ESCA). Photovoltaic, Thermoelectric and Photo electro chemical Characterization facility, Powder and Thin Film X-ray Diffractometers, XRR, FTIR Spectrophotometer, Laser Raman Spectroscopy System, SQUID Magnetometer, Dielectric and Ferroelectric set-up, Arc-melting, Auto Lab General Purpose Electrochemical System, Optical Multichannel Analyser, Closed-cycle Helium Cryotip System, High Power Argonion/Neodymium/YAG/Excimer/Dye/Ti: Sapphire Lasers, Optical Photon-correlator, Plasma Diagnostics System, VSM Facility, Microwave Processing of Materials in a single (E- or H- field) or multiple mode. Ultrahigh Vacuum Units, Vacuum Coating Units, DC and RF Sputtering Units, Concave Reflection Grating, Spatial Light Modulators, Optical Transfer Function Bench, Holographic Recording Set-up, Coherent Filtering Set-up, Facility for Optical Phase Conjugation with Photorefractives, Facility for Fabrication of Tunnel Diodes, Solar Cells, Thin Film Devices and Integrated Circuits, Optical Fibre Splicing and Characterisation Set-up, In-line Optical Fibre Components Fabrication and Testing, Fabrication and Characterization of Planar Optical Waveguides, Erbium doped fibre amplifiers, Optical Spectrum Analyser, Wavelength Meters, High resolution Microscope, DWDM wave length tuned Laser Diode light sources, Long Period Fiber Grating fabrication, variety of optical fibre sensors, and Facility for Making High Temperature Superconductors, Plasma and Photo CVD Units, DLTS, PL Facility, Optical CD Fabrication Facility. Indigenously developed HV compatible field emission measurement setup.

A new ultra fast optics (UFO) facility has been developed in the Department via a FIST Project. This UFO facility is a unique facility that caters to diverse fields of inter-disciplinary research, wherever the research activity demands high power and ultrafast light. This facility, serves a wide variety of research activities aiming at the studies of spatial and temporal dynamics of light-matter interaction or stand-alone experiments. Potential beneficiary disciplines of the faculty are expected in the field of optics, nano-photonics, material science & nano science and technology, plasma physics, optoelectronics, biology, biotechnology, medicine, chemistry and private industries. The facility is be expected to be useful to the research of other departments/Centers/ Schools of IIT Delhi namely, Chemistry, Biochemical and biotechnology, Biomedical, Electrical, textile, CARE, IDDC, polymer sciences and school of biological sciences.





**DEPARTMENT OF
TEXTILE
TECHNOLOGY**





B.K. Behera, Ph.D. (IIT Delhi)

Professor

Fabric Manufacturing Mechanics of Textile Structure, Textile Structural Composites, Modeling and Simulation, Project Management.

Head of the Department



Ashwini K. Agrawal, Ph.D. (Univ of Rochester)

Professor

Fibre Science & Technology, Polymers, Smart Textile Materials, Nano materials, Plasma Processing, Composite Fibres.

Apurba Das, Ph.D. (IIT Delhi)

Professor

Clothing Comfort, Nonwoven & Technical Textiles, Compression Bandage, Protective Clothing, Yarn Manufacturing, Instrumentation.



R. Alagirusamy, Ph.D. (Georgia Univ.)

Professor

Textile Performs for Composite Applications, Natural Fibre Composites, Short Staple Spinning, Structure Property Relationship of Yarns, Textile Reinforced Concrete.

Dipayan Das, Ph.D. (Tech. Univ. of Liberec)

Associate Professor

Nonwovens, Textile Structures, Product and Process Engineering.



S. Wazed Ali, Ph.D. (IIT Delhi)

Assistant Professor

Functional Finishing of Textiles (Broadly, Textile Chemistry - Dyeing & Finishing), Nanotechnology in Functional Materials (Polymers & Textiles), Eco-friendly / Green Chemical Processing of Textiles, Electro-active Polymers and Textiles.

Saurabh Ghosh, Ph.D. (Basel Univ., Switzerland)

Associate Professor

Tissue Engineering, Medical Textile, Polymeric Nanomaterials.



B.S. Butola, Ph.D. (IIT Delhi)

Associate Professor

Textile Chemical Processing, Polymeric Nano Composites, Enzymatic Processing of Textiles, Ballistic Textiles.

Bhuvanesh Gupta, Ph.D. (IIT Delhi)

Professor

Biotextiles, Tissue Engineering, Wound Care Systems, Intelligent Polymers & Fibres, Radiation and Plasma Processing, Nano biotechnology and Nanomaterials.



R. Chattopadhyay, Ph.D. (IIT Delhi)

Professor

Yarn manufacturing processes, Quality assurance, Ropes and cordages, Product development.

Deepthi Gupta, Ph.D. (IIT Delhi)

Professor

Surface Functionalization, Functional Clothing, Garment fit and sizing.





S.M. Ishtiaque, (Tech. Univ. of Liberec)
Professor
 New Spinning Technologies, Yarn Structure,
 Machine Design, Textile Management.



Manjeet Jassal, Ph.D. (IIT Delhi)
Professor
 Speciality & Innovative Polymeric Materials
 for Textile Applications, Smart Textiles,
 Nanomaterials and Nanomaterials reinforced
 composites, Electrospinning.



Mangala Joshi, Ph.D. (IIT Delhi)
Professor
 Nanotechnology Applications in Textiles,
 Polymer Nanocomposite Fibres,
 Nanofibres and Nanocoatings, Bioactive and
 Functional Textiles.



V.K. Kothari, Ph.D. (Leeds Univ.)
Emeritus Professor
 Comfort Aspects of Clothing, Technical Textiles,
 Product Development, Evaluation of Textiles
 and Quality Management.



Abhijit Majumdar, Ph.D. (Jadavpur Univ.)
Associate Professor
 Protective Textiles, Fabric Manufacturing,
 Soft Computing Applications,
 Operation Management.



Samrat Mukhopadhyay, Ph.D. (IIT Delhi)
Associate Professor
 Natural Fibres and Modification Techniques,
 Composites, Post-Spinning Operations,
 Process and Product Development.

Bhanu Nandan, Ph.D. (Kanpur Univ.)
Assistant Professor
 Self-Assembly in Polymers,
 Polymer Crystallization, Electrospinning,
 Organic-inorganic Hybrid Fibres, Small Angle
 Scattering Techniques in Polymers.



Amit Rawal, Ph.D. (Bolton Univ.)
Associate Professor
 Nonwovens, Modelling of Fibrous Assemblies,
 Technical Textiles.



R.S. Rengasamy, Ph.D. (IIT Delhi)
Professor
 Texturing, Garment Technology, Mechanics
 of Yarns and Machines, Clothing and
 Comfort, Oil Spill Removal using Fibrous
 Materials, Nonwovens.



Kushal Sen, Ph.D. (IIT Delhi)
Professor
 Textile Chemical Processing, Texturing of
 Synthetics/Natural Fibres and Blends, Special
 Finishes, Structure-property Correlations.



Rajiv K. Srivastava, Ph.D. (KTH, Sweden)
Assistant Professor
 Biodegradable Polymers, Enzyme Catalysis,
 Emulsions and Suspensions, Structure-
 Property Relationship, Electrospinning.



INTRODUCTION

The Department offers a B.Tech. programme in Textile Technology and two M.Tech. programmes in Textile Engineering and in Fibre Science and Technology, besides offering the Doctoral program. The departmental activities are focused on niche and futuristic areas, such as technical & smart textiles, nanotechnology applications, biotextiles, engineering of functional apparel, etc. The department has tie-ups with several universities in India and abroad.

ACADEMIC PROGRAMMES

UNDERGRADUATE

The B.Tech. program in Textile Technology covers development and characterization of the polymeric raw materials and methods of conversion of the same into textile materials followed by further value addition and appropriate engineering into niche products. Issues related to the management of the production facilities and marketing the products are also covered adequately.

POSTGRADUATE

The M.Tech. programme, in Textile Engineering focuses on training for mechanical processing of textile fibres into various textile products. The M.Tech. programme in Fibre Science and Technology trains students for the manmade fibre industry as well as in the chemical processing of textile materials.

RESEARCH

Current areas of doctoral and post-doctoral research include study of structure and properties of fibres and fibrous materials, analysis and design of yarn and fabric formation systems, mechanics of production processes, comfort properties of textiles, optimization and mechanism of dyeing and preparatory processes, eco friendly processing, micro encapsulation, antimicrobial finishes, nanotechnology applications, plasma treatment, design of technical textiles, smart and innovative textiles, electroconductive textiles, medical textiles and tissue engineering, polymer composites and apparel engineering. The activities are supported by several funded projects.

LABORATORY FACILITIES

The department has several state of art laboratories which are briefly described below:

Fibre Science and Fibre Production Laboratory: This laboratory houses facilities starting from fibre Production to fibre Characterization. It hosts a complete range of characterization equipment such as DSC, TGA and TMA, Brookfield Rheometer, FTIR, Wide angle X-ray diffractometer, sonic modulus analyzer, etc. It also houses facilities for polymerization from small to pilot scale. Recently bicomponent fibre production facility has also been installed.

Yarn Manufacturing Laboratory: has equipment and machinery for producing yarns with different technologies at research as well as production scale. Staple fibre yarns using ring and friction spinning technologies and air texturized yarns can be produced. For small-scale sample production, Miniature spinning plant is also available. New additions include miniature spinning line and units for twisting and wrapping.

Fabric Manufacturing Laboratory: The Weaving section is equipped with modern preparatory machines and looms. Preparatory section includes latest Schlafhorst 332 model winding machine, Savio lab model Orion winding machine and sectional warping machine with all controls. In weaving section- projectile, rapier, and airjet looms as also a sample loom along with single end sizing and warping machine are installed. Apart from these, the lab is equipped with needle loom for tape and label, Staubly electronic dobby and Bonas electronic jacquard. Weaving section is also equipped with a CAD station system for both woven and printed design. Knitting section includes flat knitting machines. Nonwovens Research laboratory is part of this lab. Industrial sewing machines constitute the garment technology facility.

Textile Chemical Processing: Housed in this laboratory are lab-scale versatile equipment for chemical processing of textile fabrics, yarns and fibres. In addition, the laboratory contains relevant analytical/testing equipment for assessing performance of the treatment imparted to the textiles including computer colour matching systems, spectrophotometers, fastness testers, flame retardancy testers and a full fledged anti microbial testing facility. Textile Chemistry laboratories are equipped with a wide range of dyeing, printing and finishing machines including Rota dyer, HTHP dyeing machine, winch, pressure jig, and package dyeing machine. New additions include colour dispensing systems and vortex dyeing machine.

Textile Testing Laboratories of the department has modern instruments for testing various types of fibres, films, yarns, fabrics and carpets. Fibres can be tested for single fibre and bundle strength, breaking extension and yarn can be tested for mass irregularity (U% or C.V %) imperfections, spectrogram, hairiness, twist, yarn to yarn friction and abrasion resistance. Fabrics can be tested for practically all the normal specifications such as warp and weft count, fabric mass per unit area (gsm), tensile and tear strength, flat and flex abrasion resistance, crease recovery, compression recovery, creep, thermal insulation, pilling, air permeability, water permeability, bending rigidity, compressibility, thickness etc.

Computer and Microprocessor Laboratory: Facilities in these labs are used by students for course work, internet search, preparing reports, analyzing test data and preparing presentations. The microprocessor section of this lab is used to teach control and monitoring systems.

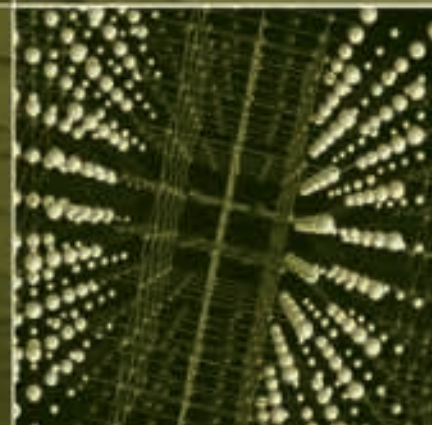
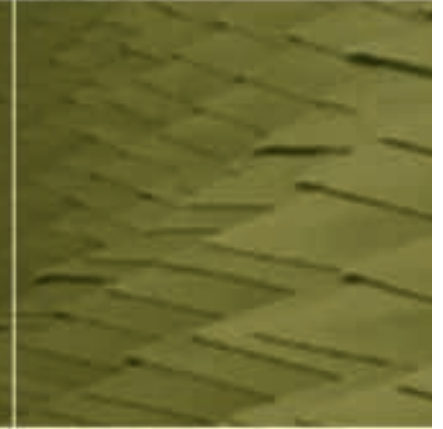
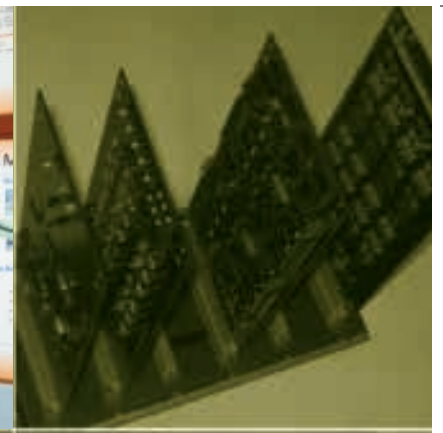
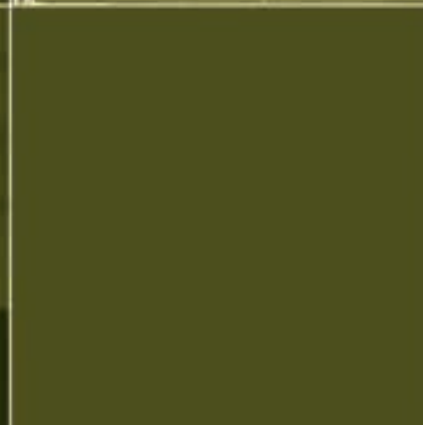
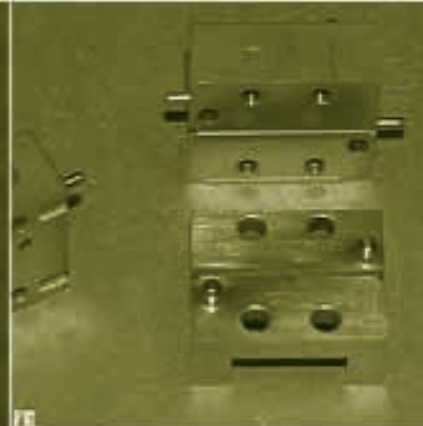
Resource Centre and Library: The resource centre is a repository of resources essential for investigators to further their research, for a student to continuously upgrade his knowledge database and for a teacher to keep abreast with the state of art in today's world of textiles. The resource centre has a wide compilation of books, reports, theses (Ph.D., M.Tech., and B.Tech.) and journals. It also has a rich collection of samples of technical textiles for various applications.

New Facilities: The newly created facilities include SMITA (Smart and Innovative Textile Materials), Medical textile and Protective textile laboratories.





CENTRE **FOR**
APPLIED
RESEARCH IN
ELECTRONICS





Arun Kumar, Ph.D. (IIT Kanpur)
Professor
Digital Signal Processing, Speech, Audio and Underwater Acoustics.

Head of the Centre



Mahesh P. Abegaonkar, Ph.D. (Pune Univ.)
Associate Professor
Microwave Engineering, Antennas.

Samaresh Das, Ph.D. (IIT Kharagpur)
Assistant Professor
Nanoelectronics and Optoelectronics.



Monika Aggarwal, Ph.D. (IIT Delhi)
Associate Professor
Signal Processing, Communication, Sensor Array Processing and Underwater Acoustics.

S.K. Koul, Ph.D. (IIT Delhi)
Professor
Microwave and Millimeter Wave Engineering, Antennas and RF MEMS.



Prabhu Babu, Ph.D. (UU, Sweden)
Assistant Professor
Signal Processing and Communications, Machine Learning and Optimization.

Saakshi Dhanekar, Ph.D. (Jamia Millia Islamia)
INSPIRE Faculty
Nano-sensors, Microfluidics, Porous Silicon fabrication and applications for chemical and bio-detection.



R. Bahl, Ph.D. (IIT Delhi)
Professor
Sensor Signal Processing, DSP System Design, Underwater Acoustics, Bio-Acoustics.

Suneet Tuli, Ph.D. (IIT Delhi)
Professor
Nondestructive Characterization, Thermography & Thermal Imaging System.



Ananjan Basu, Ph.D. (Univ. of California)
Professor
Microwave and Millimeter-wave Engineering.

Vikram Kumar, Ph.D. (Lehigh Univ.)
Emeritus Professor
Semiconductor Physics and Technology, Nanotechnology.



Sudhir Chandra, Ph.D. (IIT Delhi)
Professor
Microelectronics Technology, MEMS Technology, Sensors and Actuators.

Ulrich L. Rohde, Ph.D. (Clayton University, USA)
Honorary Professor
Microwave circuits, (Amplifiers, Oscillators and Mixers) as well as Frequency Synthesizers.



INTRODUCTION

The Centre for Applied Research in Electronics focuses on research and training in specialized areas of Electronics. The areas encompass Signal Processing, Microwaves, Microelectronics and Non-destructive Characterization Techniques. The Centre has several excellent laboratory facilities for post-graduate training and conducting advanced research work.

ACADEMIC PROGRAMMES

POSTGRADUATE

M.Tech. in Radio Frequency Design and Technology (RFDT) [Duration: 2 years/4 Semester]

A multidisciplinary masters program in Radio Frequency Design & Technology is offered by the Centre. The program provides specialization in Microwave / Microelectronics / Signal Processing. This course is unique in India imparting hands-on training focusing on hardware in a wide range of topics like digital signal processors and applications, speech processing, wireless and underwater communications, antenna design, active and passive circuit design at microwave and millimeter wave frequencies, fabrication of solid state devices, MEMS based sensors and actuators, RF MEMS etc. The projects done by the students are hardware intensive. Frequently, the projects are part of deliverable products for sponsoring agencies.

RESEARCH AREAS

The Centre offers doctoral programme which is highly rated in the country.

Signal Processing: Underwater and air acoustics applications, speech and audio processing, signal processing for communications, systems and algorithms for object detection, localization, tracking and navigation, multi-sensor data fusion.

RF & Microwaves: RFIC and RFMEMS, imaging and surveillance, active and reconfigurable antennas and arrays, non-linear modeling and measurements, microwave, millimeterwave components and Millimetre-wave data links.

Microelectronics: MEMS devices and technologies, sensor development, nanostructured materials and devices.

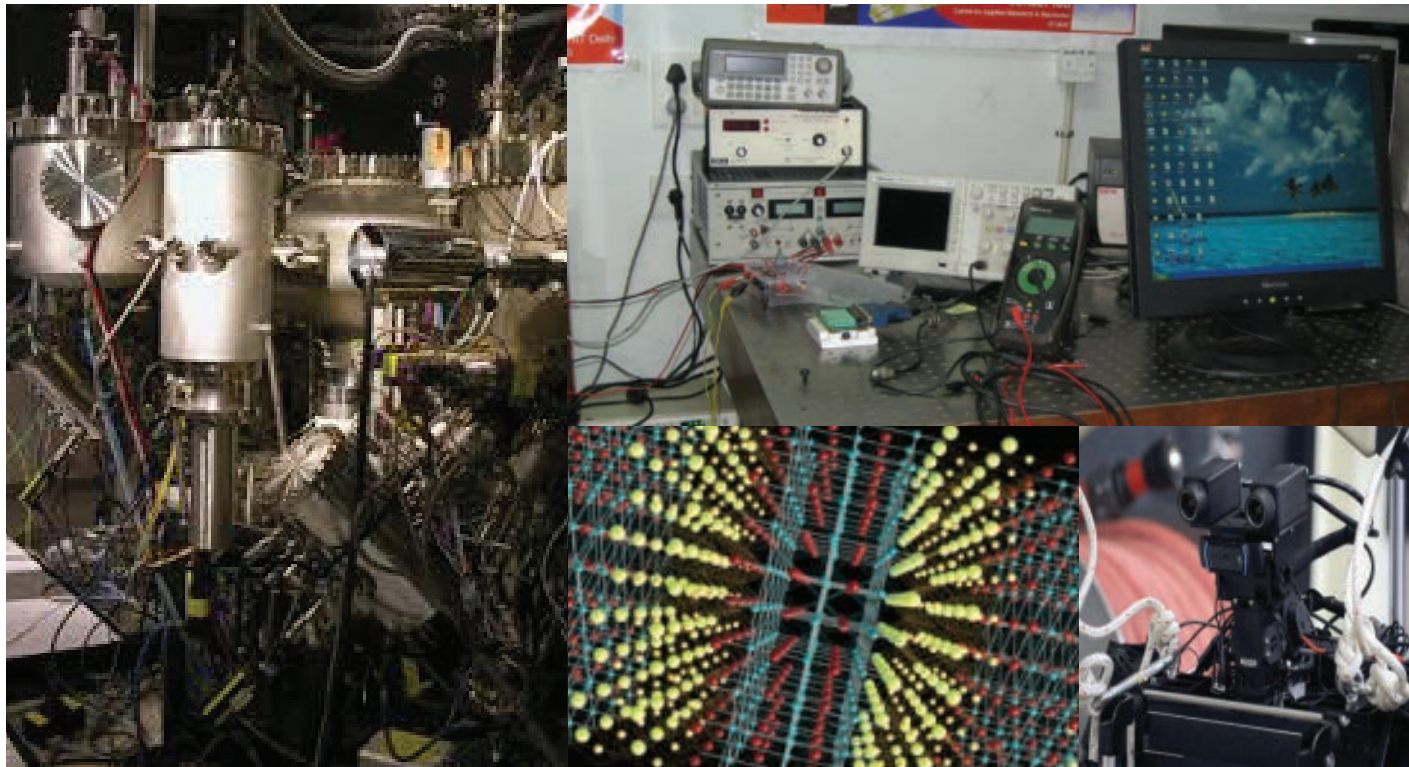
Non-destructive Characterization: Techniques and systems.

LABORATORY FACILITIES

The Centre has several state-of-the art facilities, this includes:

Anechoic chamber for antenna testing and characterization, Vector network analyzers (upto 110 GHz) and

Spectrum analyzer (upto 40 GHz), Probe stations, Free space material property measurement, Real time oscilloscope upto 25 GHz, RF, MEMS and EM simulation tools, Reactive ion etching and RF sputtering System, Thermal evaporation System and diffusion/oxidation furnace, Thermal, acoustic, optical and magnetic systems for non-destructive characterization, Surface profiler for thickness measurement, Texas Instruments DSP Processor Kits, NIDAQ Systems, Labview, Underwater acoustic tank facility for real-time underwater experiments, High speed multi-channel data acquisition systems and signal analysis tools, Full Anechoic Chamber and Speech Processing research studies, Kerr Effect Measurements, 48 node computational cluster, Magnetorelaxometry.





CENTRE

FOR

ATMOSPHERIC
SCIENCES



वायुमंडलीय विज्ञान केन्द्र
CENTRE FOR ATMOSPHERIC SCIENCES

Head of the Centre



A.D. Rao, Ph.D. (IIT Delhi)

Professor

Developing numerical models for coastal ocean state prediction system along the Indian coasts; Modelling of storm surges and associated inundation, internal waves and wind waves.



Poornima Agarwal, Ph.D. (Srinagar, J&K)

Senior Scientific Officers-I

Environmental Chemistry, Mathematical Techniques.



Sagnik Dey, Ph.D. (IIT Kanpur)

Assistant Professor

Aerosol-cloud-precipitation Interaction, Impacts of Aerosols and clouds on climate, Characterization of aerosols and clouds using 'remote sensing' and 'in-situ observations', Climate change and health.



Dilip Ganguly, Ph.D. (Physical Res. Lab., Ahmedabad)

Assistant Professor

Aerosol-cloud-precipitation interaction, Cloud parameterization, Radiative Forcing and Climate Change, climate sensitivity and feedback processes, Climate diagnostics using model output and observations, Monsoon Dynamics.



Saroj K. Mishra, Ph.D. (IISc., Bangalore)

Assistant Professor

Numerical Modelling of the Atmosphere, Hierarchical Climate Modelling, Indian Monsoon, Interaction between Dynamic and Physical Processes, Modelling of Climate Change.



Manju Mohan, Ph.D. (IIT Delhi)

Professor

Atmospheric Boundary Layer Modelling, Chemical Transport Modelling and Atmospheric Pollution, Urban Meteorology: Heat Island and Thermal Stress Studies, Fog Prediction with models and Measurements.

Vimlesh Pant, Ph.D. (Indian Inst. of Tropical Metrology, Pune)

Assistant Professor

Physical Oceanography, Ocean Modelling, Atmospheric Aerosols, Meteorological and Oceanographic Observations.



Krishna Achuta Rao, Ph.D. (Tulane Univ.)

Associate Professor

Climate modelling, climate model validation, climate variability, climate change detection and attribution, ocean heat content, sea-level rise, air-sea heat transfer and climate data analysis tools.



Somnath Baidya Roy, Ph.D. (Rutgers, USA)

Associate Professor

Land - atmospheric Interaction, Renewable Energy, Wind energy, Boundary layer processes.



Maithili Sharan, Ph.D. (IIT Delhi)

Professor

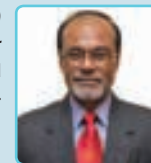
Air Pollution Modelling, Atmospheric Boundary Layer, Computational and Mathematical Methods, physiological fluid dynamics.



S.K. Dash, Ph.D. (Physical Res. Lab, Ahmedabad)

Emeritus Professor

Monsoon Studies, Climate Modelling and Meteorological Computing.





Sandeep Sahany, *Ph.D. (IISc., Bangalore)*

Assistant Professor

Tropical deep convection, High frequency rainfall variability, Climate modeling, Climate change, Regional climate downscaling.



O.P. Sharma, *Ph.D. (IIT Bombay)*

Emeritus Professor

Ocean Atmospheric Circulation Modelling, Aerosols and Atmospheric Chemistry, Methods of Applied Mathematics.

Hunt J.C.R., *Ph.D. (Cambridge University, U.K.)*

Sir Gilbert Walker Chair Professor

Fluid Mechanics, Turbulence, Magnetohydrodynamics, Meteorology, Climate and applications, Air pollution dispersion, Oceanographic processes.



INTRODUCTION

The Centre for Atmospheric Sciences (CAS) was set up in the year 1979 with the objective of undertaking modelling studies of atmospheric and oceanic processes for a better prediction of monsoon and its variability. Subsequently, the Ministry of Education, Government of India funded the Centre under the Sixth Five Year Plan. The Centre was also co-sponsored by the India Meteorological Department with a view to initiate research and mathematical modelling in meteorology in an academic institute. In 1981, the Planning Commission upgraded CAS to an advanced Centre for research. In order to complement its research activities, the Centre started the Ph.D. programme in atmospheric sciences which was the first of its kind in the country. In 2008, CAS started the M.Tech. programme in "Atmospheric and Oceanic Sciences & Technology" with the support of Ministry of Earth Sciences and Indian Space Research Organization. In the year 2011, the UG Minor Area Programme "Atmospheric and Oceanic Sciences" was initiated, which is the only one of its kind in the country. Currently, the Centre has faculty strength of 13. In the last six years, 20 Ph.D. and 47 M.Tech. degrees have been awarded by the Centre. Based on the number of research publications, degrees awarded, courses offered and student/faculty strength criteria, we estimate that CAS is ranked nationally among the top two Centres/Departments in the field. According to the 2011 US National Academy of Sciences benchmarking criteria, we also compare favorably with all US Centres/Departments in our discipline.

ACADEMIC PROGRAMMES

Currently CAS has three vibrant teaching programmes, namely:

- B.Tech. Minor Area in Atmospheric Sciences
- M.Tech. in Atmospheric-Oceanic Science & Technology
- Ph.D.

UNDERGRADUATE

The Centre has initiated Minor Area Programme in Atmospheric Sciences since 2011-12. In this minor area programme, there are two core courses which deal with the Fundamentals of Atmosphere & Ocean and Climate Change. Besides these two core courses, one course on numerical modeling of atmosphere and ocean is floated exclusively for UG students. The students also have options for 26 electives where they have a wide range of choice from various applied courses covering all important topics in atmospheric and oceanic sciences. In order to complete the Minor Area Programme in Atmospheric Sciences, students need to earn 20 credits from among these courses. A mini project of 6 credits is also introduced as part of the minor area programme to facilitate completion of 20 credits.

POSTGRADUATE

- i) The M.Tech. Programme in Atmospheric-Oceanic Science & Technology was revamped this year in view of the Institute-wide M.Tech. curriculum review on the basis of gained experience, feedback from various stakeholders including students, Government research organizations and private sectors. The courses under this programme are designed to train students from diverse backgrounds in the exciting field of Weather and Climate. The courses are also oriented to help the graduated students get employed in government organizations, public and private sectors or continue in a doctoral program within the country and abroad. There are 11 core courses including three bridge courses and a Major Project. In addition to these core courses, there are a number of electives which include all state-of-the-art topics in atmospheric and oceanic sciences. Some special modules for one credit are also floated every semester which are usually timed with the visits of distinguished scientists from inside the country and abroad.
- ii) The Ph.D. programme is for highly motivated students interested in an academic career. In addition to a thesis on a state-of-the-art topic, students are required to complete at least 6 credits of coursework.

RESEARCH AREAS

The goal of CAS is to carry out cutting-edge interdisciplinary research and create highly skilled manpower through M.Tech. and Ph.D. programmes in 4 core areas: atmospheric modeling, oceanic modeling, air pollution and climate science. In the last five years, CAS faculty has published more than 150 publications in peer-reviewed SCOPUS journals. Regular seminars by distinguished speakers of international repute from India and abroad are arranged in the Centre so that our faculty and students can keep abreast of the latest scientific developments in the field.

Key Research Areas

Atmospheric Science: Numerical Modelling of the Atmosphere, General Circulation, Tropical Meteorology and Indian Monsoon, Land-Surface Process Modelling, Land-Atmosphere Interaction, Numerical Weather Prediction.

Oceanic Science: Coastal Ocean Processes and Modelling, Large-scale Ocean Circulation, Ocean State Simulations and Forecasting, Air-Sea Interaction Processes.

Climate: Climate Dynamics, Climate Variability and Change, Global and Regional Climate Modelling, Climate Projections, Climate Change Impacts, Geo-engineering, Climate change and Health.

Aerosols and Air Pollution: Aerosols and Health Impacts, Aerosol-Cloud-Climate Interactions, Urban Meteorology: Heat Island and Fog Prediction, Chemical Transport Modelling & Air Quality.

Applied Mathematics: Numerical Methods, Data Assimilation and Adjoint Modelling, Inverse Modelling, GPU Computing.

Renewable Energy Meteorology: Renewable Resource Assessment, Renewable Energy Forecasting.

LABORATORY FACILITIES

The Centre has developed several teaching and research laboratories including one for High Performance Computing (HPC). The laboratories are equipped with latest computing equipment including 2 Beowulf clusters for parallel numerical model simulation, RAID storage for data archiving and high-end workstations for data visualization. Additionally, the Centre has purchased priority access to 60 teraflops in the IIT Delhi HPC using a DST-FIST grant. The Centre has created a very modern M.Tech. lab for satellite image processing and interpretation with the ERDAS Imagine and Arc-GIS. There is an air pollution laboratory for the measurement and analysis of pollutants in the atmosphere.





CENTRE **FOR**
BIOMEDICAL
ENGINEERING





Veena Koul, Ph.D. (Kashmir Univ.)
Professor
Biomaterials, Medical Devices, Clinical
Diagnostics and Drug Delivery Systems.

Head of the Centre



**Sandeep Kumar Jha, Ph.D. (Bhabha Atomic
Research Centre, Mumbai)**
Assistant Professor
Biosensors; nanoparticle sensing; microfluidic
lab-on-a-chip; capillary electrophoresis microchip;
immobilization and stabilization of biomolecules.

Anup Singh, Ph.D. (IIT Kanpur)
Assistant Professor

Development of Magnetic Resonance Imaging
(MRI) Techniques/methods based on exogenous
or endogenous contrast agents, Medical Image
Processing and Data Analysis.



**Dinesh Kalyanasundaram, Ph.D. (Iowa State
University, USA)**
Assistant Professor
Biomechanics, Diagnostics, Design and development
of implants (orthopaedic & orthodontics),
Fabrication/machining of materials (laser machining).

Harpal Singh, Ph.D. (IIT Delhi)
Professor

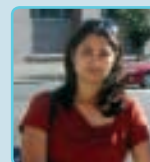
Medical diagnostics, Drug Delivery Systems,
Antimicrobial Polymers, Polymeric Hydrogels,
Nanobiotechnology, Polymer based Implants &
Medical Devices.



**Amit Mehndiratta, M.B.B.S., D.Phil. (University of
Oxford, U.K.)**
Assistant Professor
Quantitative medical image analysis for CT and MRI,
Perfusion and Diusion imaging, Neuro-Rehabilitation,
Mobile Healthcare.

Neetu Singh, Ph.D. (Georgia Tech., USA)
Assistant Professor

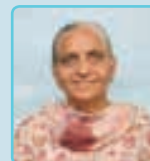
Design of nano-structured materials for
biomedical implants, cancer diagnostics &
therapy, tissue engineering and drug delivery.
Study of the bioactivity of nanostructures and
finding structure-bioactivity relationships.



S.M.K. Rahman, M.Tech. (Univ. of Allahabad)
Assistant Professor
Computer architecture, embedded systems,
microprocessor based industrial control, digital
hardware design and medical electronics.

Sneh Anand, Ph.D. (IIT Delhi)
Emeritus Professor

Biomedical Instrumentation, Rehabilitation
Engineering, Biomedical Transducers and Sensors,
Biomechanics Technology in Reproduction
Research. Controlled Drug Delivery System.



CENTRE FOR BIOMEDICAL ENGINEERING

The Centre was established in 1971 as a Joint venture of Indian Institute of Technology Delhi and All India Institute of Medical Sciences, Delhi. The Centre has applied engineering principles to address medical and biological problems and over the years developed many collaborative projects with major institutes and hospitals in India. It has provided an interdisciplinary base to develop health care technologies.

The growth rate of CBME IITD is comparable to any global R&D. Over the last two decades, the focus of the Centre has shifted to include biological medicine, behaviour or molecular health, rehabilitation and understanding of injury mechanics, development of innovative synthetic materials, implants, devices, and informatics approaches for the prevention, diagnosis and treatment of various diseases. Innovations in instrumentation, drug delivery, tissue engineering and biosensors have been internationally recognized. The Centre has become one of the premier centres in the country for biomedical engineering research.

ACADEMIC PROGRAMS

Courses relevant to Biomedical Engineering is offered at IIT Delhi and include Introduction to Basic Medical Sciences for Engineers, Industrial Biomaterial Technology, Research Techniques in Biomedical Engineering, Tissue engineering, Biomaterials, Biosensor Technology, Medical Imaging and Processing, Emerging Biomedical Technology & Health Care, Vascular Bioengineering, Biomechanical Design of Medical Devices. The centre has also initiated the process to launch its own M.Tech. program.

RESEARCH

The broad areas of research are:

The Centre's R&D is focused in four thrust areas: **Biomaterials; Bioinstrumentation; Biomechanics; Medical Imaging**. The specific topics, which are being researched include Medical Imaging, Biosensor applications, Lab-on-a-chip, Microfluidics, Capillary Electrophoresis Microchip, Rehabilitation Engineering, Biomedical Transducers and Sensors, Technical validation of Alternate medicine, Neuro-endoscopy, Integrated Health Care, Nano medicine, Controlled Drug Delivery System, Soft skin regeneration, Wound healing, Cancer diagnostics and therapy (including biomarkers), Brain and cancer targeting of bioactive molecules, Orthopaedics, Biomechanics, Recombinant DNA, synthetic biology, Computational analysis and software packaging, Bench to bedside research from phantoms to in-vivo in the areas of breast cancer and functional brain translational mapping.

The average number of Ph.D. students graduated over the last 5 years per faculty has been 4.4 and the average SCOPUS cited publication per faculty is 8. The amount of research projects per faculty is 70 Lakhs and industrial consultancy is 1.44 Lakhs per faculty per year in past 5 years. Recently, major facilities such as confocal laser and

Raman spectroscopy have been installed. New labs based on drug delivery, Skin regeneration, Lab-on-a-chip, laser micromachining and image processing have been initiated.

Technology developed by the centre include:

Novel kit for assay of iron in biological fluids; Modulated DC Iontophoretic Device; electroculogram based Multimode Controller; Device for External Counter Pulsation Therapy ; Zig-G, A Wireless ECG system; A Pneumatic Damper Controlled AK Prosthesis; Development of a Biomedical Engineering application Toolkit (BEAT); Contra Lateral Limb Controlled Prosthetic Knee Joint; Wireless ECG patch and system for obtaining High Definition mobile ECG; A Surgical Stapler; Bilayer dressing for wound healing.

The Centre has in past transferred following Technologies to industries:

Heat sealable coatings onto paper for adhesion with PVC polyester and polystyrene films for packing application; Immobilization of aminocyclase on functionalized acrylics for production of 6- aminopenicillanic acid from penicillin; Antimicrobial acrylic bone cement for fixation of hip and knee joints; Polymeric nanoparticles and process of preparation thereof for delivery of peptide based anticancer agents; Contra Lateral Limb Controlled Prosthetic Knee Joint; Blow Switch; Touch Pad and Word Editor; Remote Mouse and Word Editor; Iontophoretic Transdermal Device for delivery of Declofenac; opto electronic hemoglobinometer and Surgical Stapler.

LABORATORY FACILITIES

The Centre has the following laboratory facilities: Bioelectronics, Biomechanics, Biomaterials, Biosensor, Animal Experimentation (AIIMS), Bio-signal Processing, Tissue Engineering, Drug delivery Laboratory, Characterization of Nanoparticles, Nanomaterial Synthesis Lab, Laser Micromachining Lab, Lab-on-a-chip, Biomedical Measurement Systems, Medical Imaging Analysis.



COMPUTER
SERVICES

CENTRE



Huzur Saran, Ph.D. (Univ. of California, Berkeley)
Professor
High Speed Network, Graph Theory & Algorithms.

Head of the Centre



P.K. Baboo, Ph.D. (Berhampur)
Senior System Programmer
Database Management Systems, System Analysis and Design, System Administration.

Pragya Jain, Ph.D. (IIT Delhi)
Senior System Programmer
Parallel Processing, Cloud Computing & Virtualization, Systems Administration, Numerical Analysis.



Rajesh Bhat, Ph.D. (IIT Delhi)
Senior System Programmer
Artificial Intelligence, Distributed and Network Computing, Component & Object Technologies in JAVA, Image Processing, E-Education Technologies, System Administration, Intelligent Imaging in medicine and GIS.

Jaya, M.Tech. (IIT Delhi)
Senior Programmer

System Administration, Application Software, Object Oriented Programming, Programming Languages, DBMS.



Raj Kumar Chauhan, M.C.A. (MITS, Gwalior)
Senior Programmer
Networking & Systems Administration.

Sunil Kak, M.Tech. (IETE)
Senior System Programmer
System Administration, Management of Linux & Windows Services and Network Management.



P.K. Gupta, M.Tech. (IETE)
Senior System Programmer
Database Management Systems, System Analysis and Design, System Administration.

N.C. Kalra, M.Tech. (IIT Delhi)
Manager (SG)
Networking, Internet Computing, Microprocessor Based System Design, System Programming.



S.R. Hegde, Ph.D. (IIT Delhi)
Senior System Programmer (SG)
CAD/CAM/CAE Service.

Gopal Krishen, M.Sc. (Kurukshetra Univ.)
Senior System Programmer
Hardware, Networking, Cloud Computing & Virtualization, System Administration, Database Management and DBA.





Subodh Kumar, *Ph.D. (Univ. of North Carolina)*
Professor (Associate Head)
Computer Graphics, Visualization, Geometry, High
Performance Computation.



Ram Lal, *Ph.D. (Jamia Milia Islamia University)*
Senior Programmer
Object Oriented Programming, System
Administration, Information Technology,
E-Governance, MATLAB programming,
Image Processing.

K. Narayanan, *M.Sc. (Delhi Univ.)*
Senior System Programmer (SG)
Database Management Systems, System
Analysis and Design, System Administration.



R. Raghavan, *M.Sc. (IIT Delhi)*
Senior System Programmer
Database Management Systems, System
Analysis and Design, System Administration.



INTRODUCTION

The Computer Services Centre provides round the clock computing and networking facilities to serve a user population of about 10,000 users consisting of undergraduates, postgraduates, research scholars, faculty and staff of the Institute and provide advice on all the aspects of academic computing. The Centre also participates in the academic programmes of various departments and centers.

GENERAL COMPUTING FACILITIES

The Centre is equipped with 112 HP blade servers out of which 64 Blade Servers are used for Cloud computing with 200 TB of virtualized storage and 48 blade servers with 80 TB of storage for user homes and infrastructure use like email, proxy, web services etc. CSC also has 460 desktop computers and ten Dell workstations for Simulation connected over a switched fast Ethernet. Uninterrupted Power Supply is provided through 2x 80 KVA MGE UPS system and DG set.

HIGH PERFORMANCE COMPUTING (HPC)

The HPC facility in the Data Centre consists of the following:-

Compute Nodes: 422 (CPU nodes: 238, GPU nodes: 161 & Xeon Phi co-processors: 23)

Basic configuration:-

GPU: 2x NVIDIA K40 (12GB, 2880 CUDA cores)

Xeon Phi: 2x Intel Xeon Phi 7120P (16GB, 1.238 GHz, 61 cores)

CPU: 2x E5-2680 v3 2.5GHz/12-Core

RAM: 64 GB

8 CPU, 8 GPU and 4 Xeon Phi nodes have 512 GB RAM each

Storage:- Home space: 500 TB and Scratch space: 1000 TB

In addition there are CUDA based GPU mini-cluster environment of 16 nodes, each with 2x8 core ES-2670 (Sandy bridge) CPU, 64 GB RAM and 2xNvidia K20 GPUs.

Facilities/Services

- The **email facility** is provided to all students, staff and faculty with webmail interfaces Roundcube and Squirrelmail using user and mailing list definitions from the IITD LDAP and Kerberos for user authentication.
- **Compute facilities** for research and projects are provided through Baadal, the Cloud Computing environment.
- The CSC provides **Infrastructure Services** through virtualization technology.

- The CSC has **Microsoft Volume Licensing** EES agreement for the Campus under which Microsoft software such as Windows OS, MS Office etc. are available for use.
- The center has the following **third party software packages**: Matlab, Mathematica, Abaqus, Ansys, Fluent, Comsol, Labview, etc.
- The center maintains **local repositories** of several popular open-source and commercial licensed software. The system is fully integrated with IITD LDAP and Kerberos.
- The CSC has configured **moodle** a public domain course management software, for use by faculty and students for the courses running during the semester.
- IIT Delhi is also a part of **eduroam**, a global Wifi roaming programme across academic campuses through ERNET India.
- **Own Cloud**, a file and document sharing utility similar to the popular drop box is also provided for user community. The utility supports storing and sharing of files, images, music and documents, contacts, calendars, tasks etc.
- To facilitate research downloads of huge data files through non-standard ports, **download Server: download.iitd.ac.in** can be used. Internet access can be accessed on all ports from this system and all access and downloads will be logged.
- **Virtual web** hosting facility can be used for securely hosting all websites of the form <http://xyz.iitd.ernet.in> which are not maintained by CSC.
- **User web pages** is available for the use of faculty and PhD. students for hoisting their web-pages on the server web.iitd.ac.in
- To provide **Internet access** to the visitors, the faculty and officers have been authorized to create user account for their visiting faculty/students.
- To facilitate limited access within IITD, CSC has a separate **web server *privateweb.iitd.ernet.in*** where users can have their personal web pages.
- **VPN** facility is provided to all the faculty of IITD for accessing IITD internal LAN from outside IIT Delhi. This facility has also been extended to the part-time Ph.D. students.
- Network Time Protocol (**NTP**) servers are synchronized with standard internet time servers with time drift less than a few milliseconds and can be used by all users.
- The new Data Center consists of Cisco UCS B200 M3: Three chassis with 24 blade servers each with 2x12 Cores Intel(R) Xeon(R) CPU E5-2695 v2 @ 2.40GHz ("Ivy Bridge" Generation) and 128 GB RAM. Each blade has five virtual NICs connected to two Fiber interconnects with redundant paths.

- CSC has commissioned a *disaster recovery data centre (DRDC)* in the SIT building on September 13, 2014. The DRDC has been built by IBM and can support a total IT load of 60 KW. It has redundant UPS power supplies and precision air conditioners in $N+N$ and $N+1$ configurations respectively.
- MRTG and RRDHealthGraphs have been provided to see the Status Reports of the various System activities/Services.
- Complaint Registration and Monitoring System (SLA ticketing system) has been provided for resolving user problems regarding Network connectivity and Software issues on their systems.

PC Services

There are five PC Labs in the CSC premises having about 225 Desktop computers under Windows and Linux environment running Windows 7/10 and Ubuntu 14.04 LTS. Besides this there are four computing labs in the new Lecture Hall Complex (LHC) having 235 desktop computers running Ubuntu 14.04. Projection facility is also provided for the UG/PG courses of the Institute which are held every semester. The PC Labs in the Center are open round-the-clock for authorized users.

Simulation Lab

The simulation lab is equipped with ten Dell workstations under Windows 7 for CAD/CAE/CUDA and High Performance Computing (HPC).

Network Services

The Institute LAN is a state of the art switched network with Fiber Optics and enhanced CAT5/CAT6 UTP backbone. It consists of more than 9000 network access points spread over the campus using about 265 Cisco switches and about 75 virtual LANs. Network access is provided to every student, faculty, Doctor, Laboratory and rooms in guest houses. Internet connection has been provided through a router, redundant firewall switching modules, and 2x10 Gbps from NKN.

IIT Delhi is connected to the National Knowledge Network (NKN) with 10 Gbps dual connectivity from PowerGrid and RailTel. This connectivity provides virtual routing service, Internet Connectivity, and connectivity with other Institutes connected on the NKN backbone.

Internet and Intranet access is provided to faculty/officer homes via ADSL connectivity over internal telephone lines. The academic area, main guest house, faculty guest house, RCA and Hospital are also connected through secure Wi-Fi. An independent network has been provided for administrative functions. Many network services including mail, web, and domain name, anti-virus are being provided over this network.

IITD has upgraded the routers and switches for internet and the core and distribution network and has replaced the existing multimode fiber with single mode fiber. This has made the backbone 10 Gbps ready.

Within the next few months Internet access through GPON will be provided for about 1200 residences in the campus using FTTH.



EDUCATIONAL TECHNOLOGY SERVICES



CENTRE





Sanjeev Sanghi, Ph.D. (City Univ.)
Professor
Department of Applied Mechanics.

Head of the Centre



Shouribrata Chatterjee, Ph.D. (Columbia University)
Associate Professor
Department of Electrical Engineering.

Prem K. Kalra, Ph.D. (EPFL, Switzerland)
Professor
Department of Computer Science & Engineering.



Amit Gupta, Ph.D. (UCF)
Assistant Professor
Department of Mechanical Engineering.

Kolin Paul, Ph.D. (BESU)
Associate Professor
Department of Computer Science & Engineering.



Ashok Gupta, Ph.D. (IIT Delhi)
Professor
Department of Civil Engineering.

Kushal Sen, Ph.D. (IIT Delhi)
Professor
Department of Textile Technology.



Shalini Gupta, Ph.D. (North Carolina State University, USA)
Assistant Professor
Department of Chemical Engineering.

Balaji Srinivasan, Ph.D. (Stanford)
Associate Professor
Department of Applied Mechanics.



INTRODUCTION

The Educational Technology Services Centre (ETSC) is actively engaged in promoting the use of Educational Technology at the Institute and also at the national level. Some of its major activities are:

- Design & Development of Instructional Resources (videos and web based).
- Provision and maintenance of AV equipment for classroom teaching.
- Video and computer based instructional packages.
- Organize training programmes for faculty and professionals across the country.
- Video conferencing for faculty selection interviews and meetings.
- E-learning and distance education.
- Undertake sponsored research and consultancy projects.
- Offer support for classroom teaching.

The Centre has a modern video studio with recording and editing facilities in DVCAM format. A studio-classroom with seating capacity of 60 is available for on-line recording of courses. Nonlinear editing setup and Apple Streaming server are available for post production and video streaming. ETSC takes care of the audio-visual needs of faculty and students. In addition to equipping the classroom with these facilities, ETSC runs a loan service. A media reference library with multiple viewing cabins has been set up in the Central Library for the use of students and faculty. The Educational Technology Services Centre has a computer laboratory with modern multimedia capabilities and internet connectivity. Computer Aided Instruction/Computer Aided Learning courses/packages are developed in the computer laboratory. Learning materials generated by ETSC are disseminated at nominal price throughout the country and abroad.

The Centre conducts short courses and modular programmes on different aspects of educational technology for teachers and staff from the Institute and from other educational institutions and industry institutions. These courses are designed to sensitize and guide the faculty to optimize their effort and time for classroom and laboratory instruction as well as professional development. The Centre offers its services to departments, individual faculty or groups of faculty members in revising, redesigning and innovating curricula.

The Centre has the expertise and experience of undertaking national and international level consultancy and sponsored research projects. It has worked with agencies such as the World Bank, AT&T, AICTE, UNESCO, UNDP Commonwealth of Learning. The British Council and Adis Ababa University, Ethiopia. The NPTEL project funded by MDRD has been successfully completed. Under this programme, all the seven IITs and Indian Institute of Science have worked together to develop web and video based education material for undergraduates courses initially in five disciplines, viz., Civil Engineering, Computer Science and Engineering, Electrical Engineering,

Electronics and Communication Engineering and Mechanical Engineering. The web courses so developed are available through the various servers authorized by NPTEL Phase II of NPTEL Project is nearing completion where its scope has been further expanded to include more disciplines and advanced/post graduate courses. ETSC has procured and installed Sony ANYCAST system in the Video Studio and in two lecture theatres for non linear editing and recording. Video Conferencing facilities have been installed in the two lecture theatres for non linear editing and recording. Video Conferencing facilities have been installed in the two lecture theatres and in the Conference Room of ETSC. The facility is being used for faculty interviews, meetings and distance education. For connectivity both ISDN and IP based network connection are used. For classes to Adis Ababa University, two lecture delivery rooms have been equipped with remote teaching facility. A dedicated two-way video link is also provided for live delivery. Two new lecture rooms have also been equipped with audio/video, projection, distance education and recording facilities. In addition, three Virtual Classrooms are also being equipped under National Knowledge Network (NKN).

The new Lecture Hall Complex (LHC) has become functional with state of the art audio visual facilities. The LHC includes 2 rooms of capacity 500; 3 rooms of capacity 300; 12 rooms of capacity 150; 9 rooms of capacity 60; and 6 rooms of capacity 30. The facilities include live video recording of lectures, of lectures, tablets PCs for projection of the written lectures on the screens, document visualizers and microphone and speakers in the class rooms.





CENTRE **FOR**
ENERGY
STUDIES



Viresh Dutta, Ph.D. (IIT Delhi)
Professor
Experimental Solid State Physics, Thin Film Physics, Photovoltaics.

Head of the Centre



T.S. Bhatti, Ph.D. (IIT Delhi)
Professor
Electrical Energy Systems, Reactive Power Compensation, Power System Control and Optimization, Wind & Hydro Power Generation.

Ramesh Narayanan, Ph.D. (Jadavpur Univ.)
Assistant Professor
Plasma Physics and Fusion.



A. Ganguli, Ph.D. (IISc., Bangalore)
Professor
Plasma Physics, Plasma Sources.

Dibakar Rakshit, Ph.D. (The University of Western Australia)
Assistant Professor
Waste heat recovery, Green buildings, Solar turbine fluid, Central Solar Receiver Technology, Thermal Storage, Hydrodynamics and Thermodynamics of LNG sloshing, Power plant technology, Electronic Chip Cooling, Emission control system design analysis, Energy Audit, Multiphase mass transfer, Thermal Science and Engineering applications.



Tara C. Kandpal, Ph.D. (IIT Delhi)
Professor
Solar Energy Utilization, Energy Economics and Planning.

K.A. Subramanian, Ph.D. (IIT Madras)
Associate Professor
Internal Combustion Engines and Alternative Fuels.



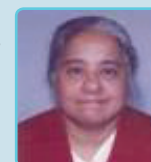
S.C. Kaushik, Ph.D. (IIT Delhi)
Professor
Thermal Science and Engineering, Solar Energy Utilization, Energy Efficiency Conservation and Management, Solar Refrigeration, Air conditioning and Power Generation, Solar Architecture, and Thermal Energy Storage, Plasmas and Fusion Energy.

G.N. Tiwari, Ph.D. (BHU)
Professor
Solar Energy Utilization, PV Hybrid System, Green House Technology, Clean Environment, Energy and Economic Analysis, Energy Conservation, Heat and Mass Transfer, Solar Architecture, Integrated Rural Energy Technology.



Vamsi K. Komarala, Ph.D. (IIT Delhi)
Associate Professor
Nanostructured metal and semiconducting Materials, Thin Film Science & Technology Plasmonic Solar Cells.

R. Uma, Ph.D. (IIT Delhi)
Associate Professor
Plasma Physics and Fusion.





Ashu Verma, Ph.D. (IIT Delhi)
Assistant Professor
Power Syatem, Renewable Energy
Systems, Micro Grids.



L.M. Das, Ph.D. (IIT Delhi)
Emeritus Professor
Alternate Fuels, Hydrogen Energy, I.C. Engines.



M.G. Dastidar, Ph.D. (IIT Delhi)
Emeritus Professor
Solid Fuel (Coal/Biomass) Conversion Processes
(Pyrolysis, Gasification, Liquefication),
Coal Bio Desulfurization, Industrial Waste and
Effluent Treatment.

Sandeep Pathak, Ph.D. (University of
Cambridge, U.K.)
Assistant Professor
Hybrid Photovoltaic Devices.



D.K. Sharma, Ph.D. (Delhi Univ.)
Emeritus Professor
Environmental Pollution, Fuel Technology,
Biotechnology, Carbon-Materials, Polymers,
Chemical Technology, Process Development.



INTRODUCTION

Energy forms an integral part of all the scientific and engineering disciplines. Since the demand for energy world-over has been leading to rise of known as well as future sources of energy. Study of energy resources and their efficient utilization has great impact on economic and social life. Energy experts are needed for developing sustainable sources of energy without impacting the environment extensively but yet be able to meet the growing demands. Centre of Energy Studies has mandated itself in training and research in Energy Engineering for serving the energy needs of the country.

ACADEMIC PROGRAMMES

UNDERGRADUATE

The Centre is offering several electives in the emerging areas of Energy and Environment for UG students on elective basis as open category courses.

POSTGRADUATE

The Centre offers the following interdisciplinary post-graduate programme, leading to the award of M.Tech. degree:

M.Tech. in Energy Studies : Full time programme for Engineering graduates and Science postgraduates.

RESEARCH

The focused topics of research at the centre are :

- Renewable Energy Sources
- Energy Efficiency
- Internal Combustion Engines
- Electrical Energy Systems
- Energy Efficiency in Buildings
- Energy Conservation and Management
- Fuel Technology
- Plasma Science and Technology
- Solar Cells

Doctoral research is being carried out in:

Energy Efficiency, Fuel Technology, IC engines, Electrical Energy Systems, Heat & Mass Transfer, Renewable Energy Systems, Nanostructured Materials, Thin Films Science and Technology, Organic and Plasmonic Solar Cells, Solar

Thermal Systems, Environmental Pollution and Energy Planning, Plasma Physics and Plasma Sources, Industrial Application of Plasma, Energy Conservation in Building & HVAC Systems.

LABORATORY FACILITIES

Excellent facilities are available in the centre for different uses of the industry and for educational and training programmes

Renewable Energy

Thin Film Deposition Facility, temperature Dependant I-V Characterization of Solar Cells using Flash Solar Simulator, Spectral Response Measurement using Filter Wheel, Lock-in based C-V-W Measurement System, Excitonic Solar Cell Fabrication Facility, Carrier Mobility Measurement Set-up, Time Resolved Photoluminescence Set-up, 25 KWp Roof Top Photovoltaic Generator, Thermal Conductivity Analyser, U Value Measurements, Alphascope and Emissometer, Solar Transmittance Measurements, Fuel Technology, Gas Chromatograph : Gas Analyser, Proximate Analysis of Fuels, Coke Reactivity Index, Ion Meter for Fluoride Measurement, Viscometer, UV- Visible Spectrophotometer, BOD Incubator with Rotary Shaker, Extractor, Bomb Calorimeter, Pyrolyser, Microbial activities related to coal, biomass and industrial effluents (Laminar Flow, Orbital Shaker), Fractionation of liquid Mixtures, Carbon Nitrogen Hydrogen Sulphur Analyser.

Environment Pollution

Indoor Comfort Meter, Low Pressure Biogas Burner Testing Facility, Rodex Potentiometer, High Rate (upto 500 kW) Oil Burner, Combustion Chamber, Channel and Exhaust System, Evaluation of Biomass Fuel Stores for Thermal Efficiency and Air Pollution Emissions, Ash Resistivity Measurements Facility to Support ESP Programme in India, Atomic Absorption Spectro Photometer.

Electrical Energy Systems

HVDC & AC transmission system, Real Time Monitoring of Micro Alternators, Vertical Axis Wind Turbine Power Generation, Micro-Hydro Power Generation, Long Transmission Line Models, Wind/Solar emulator, Lab view based real time monitoring system.

I.C. Engines

Analysis of Engine process using Computational Fluid Dynamic, Facility for Basic Engine Testing of Performance and Emission Characteristics, Dynamometer for Evaluating Engine Performance, Gas Analyser for Measuring CO, HC and NOx Emissions. Cylinder Gas Pressure Measuring and Processing, Measurement of Injection and Combustion Characteristics of IC Engine, Unit. AVL Research Engine to vary all Engine Parameters, Measurement of Flame Characteristics using AVL VISEOFEM for use of alternative Fuels, Passenger Car Engine Test Bed, Fuel Engine Development for use of alternative Fuels, Characterization of Fuel Quality for alternative Fuels.

Plasma Laboratory

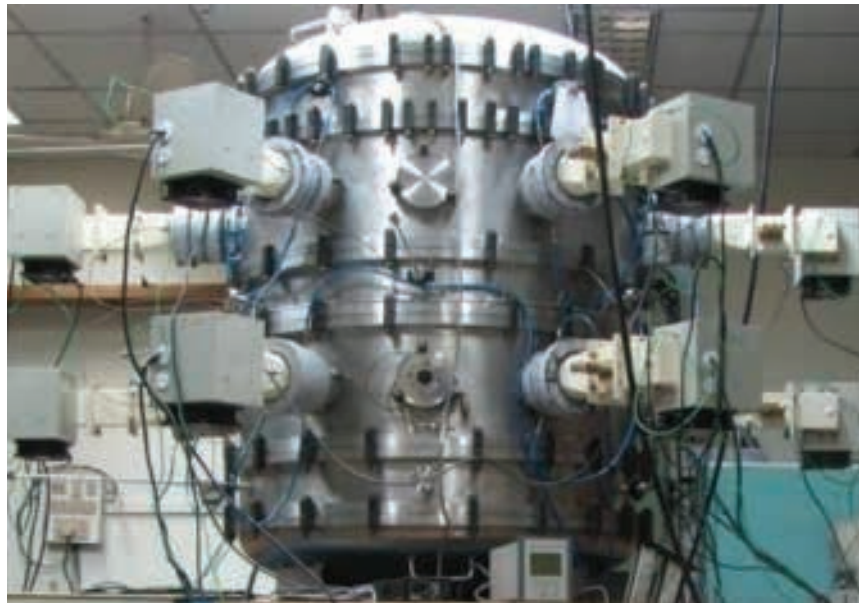
Plasma Simulation Facility, Plasma Deposition of Thin Films, Dielectric Barrier Discharge for Fuel Gas Cleaning, Negative Ion Generating System, High Speed Coating and Surface Treatment using Thermal Plasma, Broadband Power Amplifiers in RF & LF Ranges upto to a few Hundred Watts, Spectroscopic System for (a) Measuring Flame Temperature up to 3000 K (b) Spectrum Analysis of Light, Sources in Visible Range, Plasma Kits for Air / Water Pollution Control, Plasma Simulation Facilities.

Energy Audit & Conservation

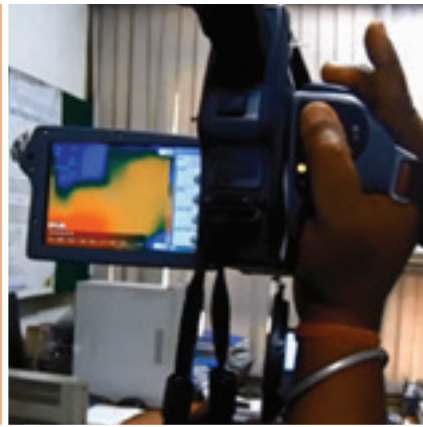
Portable energy audit instruments like temperature, humidity, velocity meters, surface temperature reading instruments, clamp type voltmeter, ammeter and powerfactor meter.

Energy Simulation Laboratory

A collection of excellent software backed by a comprehensive data base. The software packages can be used for Energy Efficient Building Design, Solar Photovoltaic and Solar Thermal System Design, Hybrid System Design and Calculation of AC loads. Optimal Power System Expansion Model including the Environmental Impacts and Design and Analysis of Electrostatic Monitoring Precipitator.



LVPS two planes Zoomed

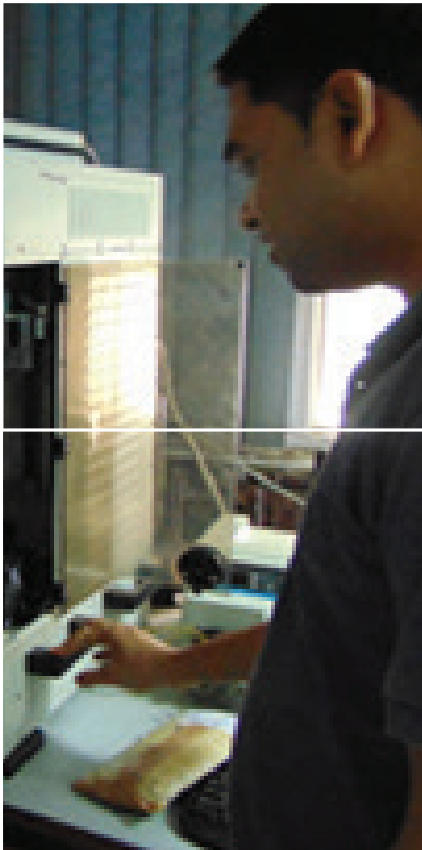


INDUSTRIAL
TRIBOLOGY

MACHINE
DYNAMICS

AND

MAINTENANCE
ENGINEERING
CENTRE





V.K. Agarwal, Ph.D. (IIT Delhi)

Professor

Dilute and Dense Phase, Pneumatic Handling of Bulk Solids and Erosive Wear.

Head of the Centre



J. Bijwe, Ph.D. (IIT Delhi)

Professor

Tribology of Polymers / Composites, Nano-Composites and Oil Analysis for Condition Monitoring.

Deepak Kumar, Ph.D. (IISc, Bangalore)

Assistant Professor

Metalworking Fluids, Nanotribology, Contact Mechanics, Atomic Force Microscopy, Surface / interface Analysis.



S. Fatima, Ph.D. (IIT Kharagpur)

DST Inspire Faculty

Reliability Based Machinery Condition Monitoring, Industrial Noise Control and Acoustical Natural Materials.

R.K. Rai, M.Tech. (IIT Delhi)

Design Engineer

Instrumentation and Non-destructive Testing.



O.P. Gandhi, Ph.D. (IIT Delhi)

Professor

Maintenance, Reliability, Risk Analysis and Safety.

N.Tandon, Ph.D. (IIT Delhi)

Professor

Vibration and Acoustic Emission Monitoring and Noise Engineering.



INTRODUCTION

Industrial Tribology, Machine Dynamic and Maintenance Engineering Centre (ITMMEC) is a specialized Centre, established under Indo-Norwegian cooperation programme. The Centre has close interaction with the industry through HRD programmes, consulting jobs and contract research. The Centre has been associated with sectors of industry like; automobiles, power, home appliances, manufacturing, mining, oil and gas, etc. The Centre has excellent laboratory facility to support industrially oriented research.

ACADEMIC PROGRAMMES

POSTGRADUATE

The Centre coordinates an interdisciplinary M.Tech. programme in 'Industrial Tribology and Maintenance Engineering'. The interdisciplinary programme is industry oriented and it offers curriculum and training, which are of relevance to the job requirement of engineers in industry. The programme is open to fresh candidates through GATE and sponsored candidates from industry and Defence. The teaching faculty is also drawn from Departments of Applied Mechanics, Mechanical Engineering and Centre of Polymer Science and Engineering (CPSE).

LABORATORY FACILITIES

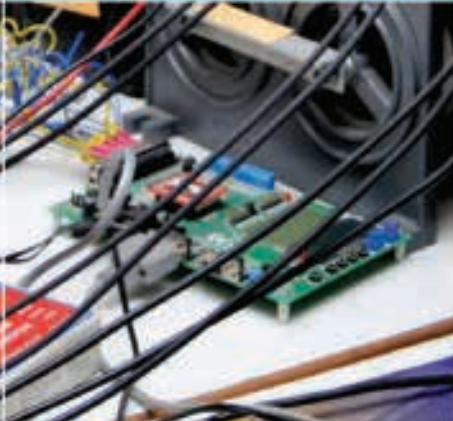
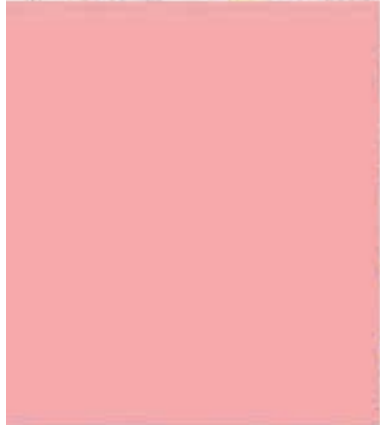
The Centre has excellent facility for experimental, analytical and development research activities. With its highly specialized manpower, the Centre interacts with industries through consultancy, field service and also joint sponsored research programmes. The Centre has well-equipped laboratories, which are: Lubrication and oil monitoring laboratory, friction & wear laboratory, machine dynamics laboratory, NDT laboratory, project laboratory and lubricant laboratory.



The ongoing research areas of the centre are:

Condition monitoring of machinery using vibration, noise, acoustic emission and wear debris, thermography, oil analysis, vibration and acoustic emission monitoring of bearing and gears, noise evaluation and control, Tribology of fiber reinforced polymer composites and nano-composites, friction, wear, and lubrication of machines and components, Tribology of non-asbestos friction materials, boundary lubrication studies, hydrodynamic and elastohydrodynamic lubrication (EHL), Engine Tribology, wear studies, development of wear resistant coating, nano-composite greases, aqueous lubrication. Design and troubleshooting of pneumatic conveying systems, residual life assessment of oils, friction and wear studies of composites and elastomers, maintenance, reliability and safety of mechanical systems.







Arun Kumar, Ph.D. (IIT Kanpur)

Professor

Digital Signal Processing, Speech,
Audio and Underwater Acoustics

Head of the Centre



S.K. Atreya, D.I.I.T. (IIT Bombay)

Chief Design Engineers (S.G.)

Industrial Design, Graphic Design Computer Aided
Design, Ergonomics Interior Design, Architecture,
Instrument Enclosures, Education Technology,
Software Development, HC Interaction Design.

A.L. Vyas, Ph.D. (IIT Delhi)

Emeritus Professor

Electronic Instrumentation, Smart Sensors,
Sensor Networking, Body Area Sensor
Networks and Signal Processing.



Gufran Sayeed Khan, Ph.D. (Friedrich-Alexander-University)

Assistant Professor

Optical Instrumentation, Applied Optics,
Interferometry, X-Ray Optics, Diffractive Optical
Elements, Computer Generated Holography, Computer
Controlled Polishing, Diamond Turning.

D.T. Shahani, Ph.D. (IIT Delhi)

Emeritus Professor

Electronic Instrumentation,
Electro-magnetics, Antennas.



Jyoti Kumar, Ph.D. (IIT Guwahati)

Assistant Professor

Human Computer Interaction Design, Consumer
Decision Making Process, Design Research
Methodology, Design for Emotion and Persuasion,
Design for Usability, User Experience Design.

Chandra Shakher, Ph.D. (IIT Madras)

Emeritus Professor

Interferometry, Holographic Optical
Elements, Fibre-optic Sensors for Power
Generating Industry, Flame Tomography
and Optical Instrumentation.



Sumer Singh, M.Des. (IIT Delhi)

Assistant Professor

Product Design, Transportation Design, Design for
Sustainability, Design Sketching, Computer Aided
Surfacing, Design Innovation.

INTRODUCTION

The Centre is interdisciplinary in nature and is engaged in design and development of instruments and other industrial and consumer products. The primary goals of Instrument Design Development Centre are to undertake research, development and training in the area of Instrument Technology.

ACADEMIC PROGRAMMES

The Centre coordinates the following POSTGRADUATE programmes

Interdisciplinary M.Tech. in Instrument Technology

This is an interdisciplinary M.Tech. programme. The teaching faculty is drawn from Instrument Design Development Centre, Departments of Electrical Engineering, Mechanical Engineering and Physics.

Interdisciplinary M.Des. in Industrial Design

This is an interdisciplinary M.Des. programme to candidates with bachelors in engineering or architecture. The programme is also open to candidates sponsored by Government Organizations and Public Sector companies on full time basis. The teaching faculty is drawn from Instrument Design Development Centre, and various other departments. The programme brings together the skills of understanding user needs, deciphering market needs and mapping the problems identified to creative solutions while keeping an eye on the existing and evolving technologies.



RESEARCH AREAS

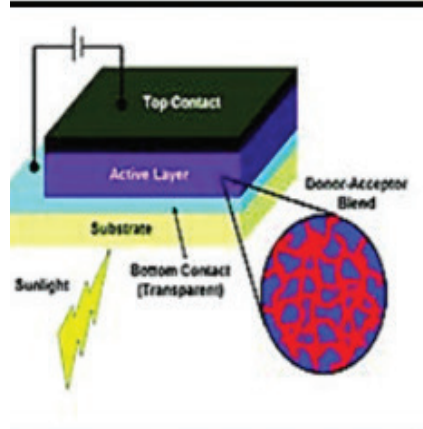
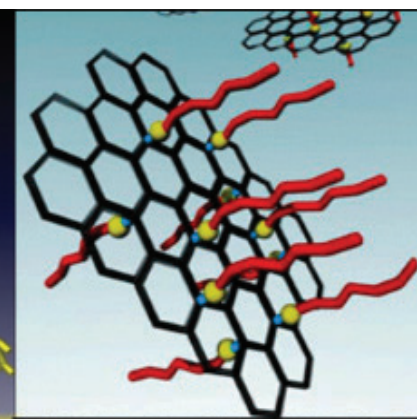
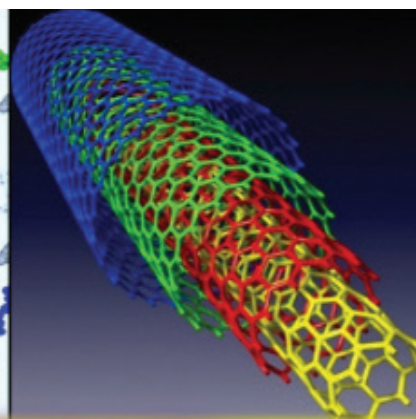
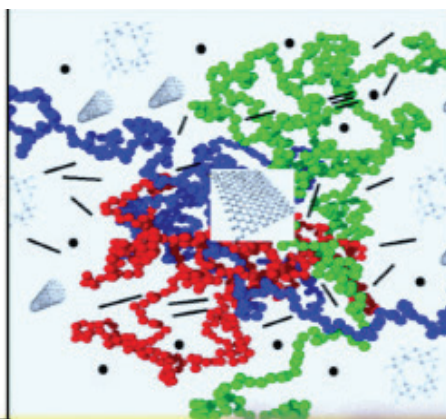
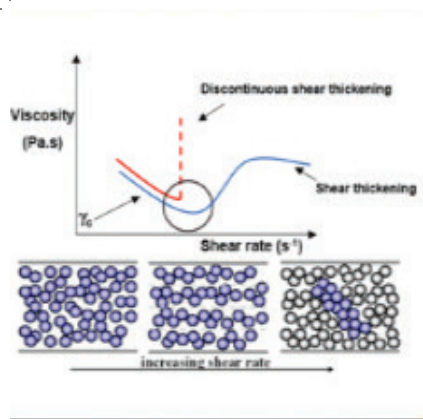
Doctoral research is being carried out in the following area:

The areas of CAD and Simulation of Electronic Systems, Microprocessor Applications, Power Electronics and Control, Electric Drives, Electromagnetic Sensors and Instrumentation, Smart Sensors and Sensors Networks, Digital System Design and DSP Applications, Digital Holography, Digital Speckle Pattern Interferometry, Flame Tomography, Fiber-Optic Sensors, Optical Coherence Tomography and 3D-surface Profilometry, Optical Tweezers and Their Applications, Optics of LEDs and OLEDs, Optical Metrology, Diffractive Optics, Aspheric and Free Form Optics and their Applications, Solid Mechanics, Stress-Strain Analysis, Mechanical Properties of polymers, Nano-Composite, Fiber re-inforced plastic composites, Computer Aided Product Design, Ergonomics, Graphic Design, Passive Solar Architecture, Environment Design, Human Computer Interface, Disaster Management, Design and Culture, Design for user Experience, Soft computing applications in product design, Sustainable product design, transportation Design, Design for sustainability, Design Innovation.

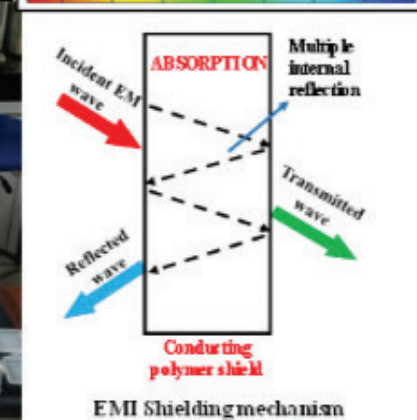
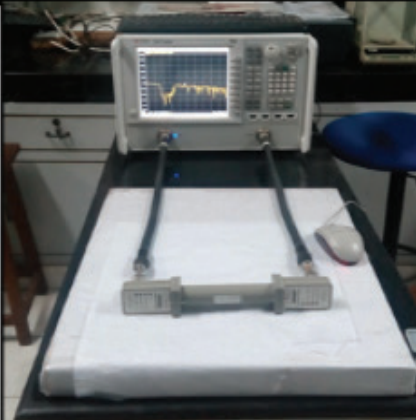
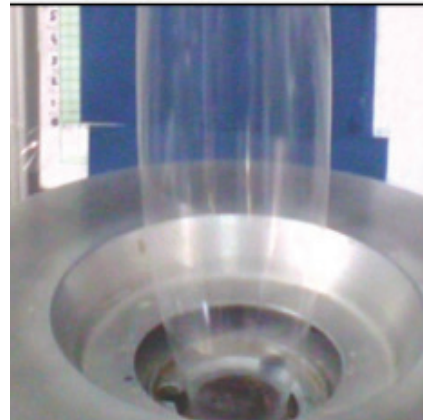
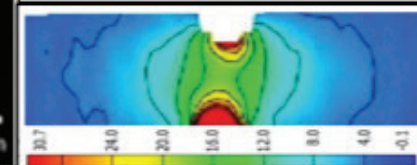
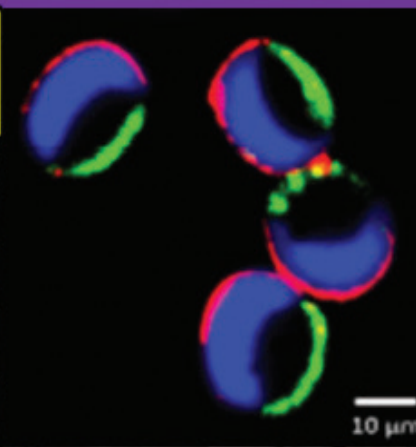
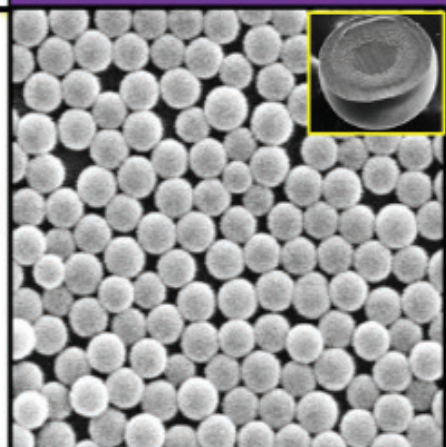
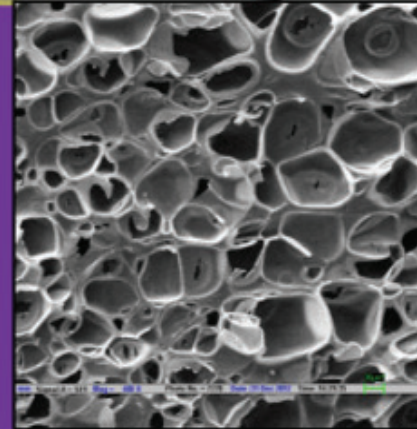


LABORATORY FACILITIES

The Centre is equipped with (a) laboratories having facilities for Analog and Digital Electronic Design, Microprocessor Systems Development, Virtual Instrumentation, Mechatronics, Electromagnetic and ultrasonic instrumentation, (b) Manpower Development in Instrument Technology Laboratory, (c) Laser Applications and Holographic Laboratory; (d) Optical Workshop, (e) Industrial Design Laboratory and Model-making Workshop, (f) Industrial Design Clinic for Product Development with Ergonomics and Computer Aided Simulation Facilities. (g) User Experience Design Laboratory. (h) It also has MAC laboratory for CAD and Multimedia.



CENTRE FOR POLYMER SCIENCE AND ENGINEERING





A.K. Ghosh, Ph.D. (SUNY/Buffalo)

Professor

Rheology and Processing, Polymer Reaction Engineering, Polymer Blends and Alloys, Mixing and Compounding, Computer Aided Modelling, Polymeric Nano-Composites, Polymer Film Processing, Cellular and Biopolymers.

Head of the Centre



Josemon Jacob, Ph.D. (Iowa State Univ.)

Associate Professor

Polymer Synthesis, Semiconducting Polymers, Polymer based LEDs and Photovoltaics, Block Copolymers Biodegradable Polymers, Polymerization Catalysis.

Bhabani Satapathy, Ph.D. (IIT Delhi)

Associate Professor

Morphology and phase behaviour of block copolymers, Polymer blends and composites, Micromechanics, Fracture and fatigue of polymer nano-composites, Tribology of polymer based materials, Biotribology, Thermo-mechanical behaviour of Biomaterials.



Leena Nebhani, Ph.D. (Karlsruhe Institute of Technology)

Assistant Professor

New Synthetic Routes for Surface and Interfacial Engineering, Controlled free Radical Polymerization Techniques, Anti-fouling and Biocompatible Polymers, Rubber Compounding and Technology, Sustainable Additives.

Veena Choudhary, Ph.D. (IIT Delhi)

Emeritus Professor

Synthesis and Characterization of High Temperature Polymer, Degradation and Stabilization of Polymers, Flammability of Plastic Materials, Smart Micro/Nano-Hydrogels for Biomedical Application, Functional Polymers for Fuel Cell Application, Polymer Blends and Nano-Composites for EMI Shielding, Biodegradable Polymer.



Sampa Saha, Ph.D. (Michigan State Univ.)

Assistant Professor

Biodegradable Polymeric Materials, Polymer Brushes, Electrohydrodynamic-jetting, Micro and Nano structured Materials, Multi-layered and Multi-compartmental Polymeric Particles.

S.N. Maiti, Ph.D. (Calcutta Univ.)

Emeritus Professor

Polymer and Rubber Technology, Compounding, Particulate Filled Composites, Thermal, Crystallization, Rheological, Morphological and Mechanical Properties, Polymer Blends, Micro and Nano-Composites, Structure-Properties, Relations in Polymer Systems.



INTRODUCTION

The Centre for Polymer Science and Engineering (CPSE) is a leading Centre in the country for teaching and research in the emerging area of polymers. The principal thrust of the Centre is manpower development and research for enhancing the fundamental knowledge as well as developing new polymeric materials. The Centre emphasizes interaction with the related industry. The changing needs of the industry are kept in view while designing and upgrading teaching and research programs.

ACADEMIC PROGRAMMS

The faculty of the Centre has the major role in teaching of interdisciplinary M.Tech. Programme in Polymer Science and Technology. The primary purpose of this programme is to train scientists and engineers to fulfill the constantly growing requirements of the polymer based industry in the country.

RESEARCH AREAS

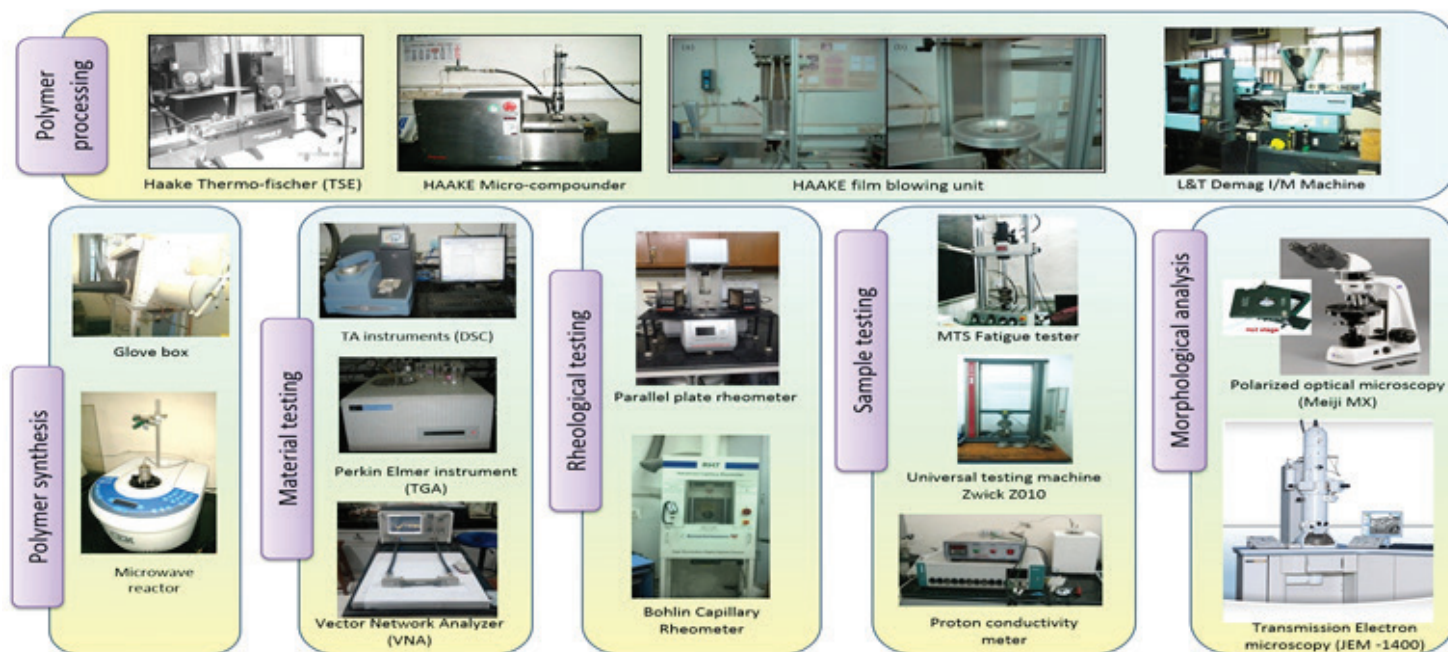
The broad area of research of the centre are: Polymer synthesis, modification of polymers, biodegradable/ photodegradable polymers, nano-Composites, flame resistant polymeric materials, high energy polymeric binders, reinforcement of polymers, testing and characterization of polymers, polymer blends and alloys, polymer compounding, rheology and polymer processing, nano-Hybrid polymer particles as drug carries, microcellular polymers, smart hydrogels, biopolymers, polymer composites, surface modification, anti-fouling and bio-compatible surfaces, multi-compartmental polymeric materials, polymer product design and modelling and simulation in processing. Sponsored research and consultancy are other major activities of the CPSE. Very large number of research projects sponsored by government organization, International Agencies and Industries have been undertaken over three decades.

Doctoral research is being carried out in the following area:

Synthesis of Speciality Polymers; Structure-Property Correlation in Polymeric Materials; Rheology and Processing of Polymers; Polymer Blends and Alloys; Fibre / Particulate Filled Thermoplastic / Thermoset Composites, Degradation and Stabilization of Polymer; Mechanical and Thermal Properties of Polymeric Systems, Reactive Polymer Processing; Modification of Polymers; Morphological Studies of Polymers; Modelling and Simulation in Processing; Design and Stress Analysis of Engineering Component from Polymeric Materials, Biodegradable Polymers, Hydrogels, Smart Micro / Nano-Hydrogels for Biomedical Application, Nano-Composites, Conjugated Materials for Electronic Applications, Polymerisation Catalysts, Fracture and Fatigue of Nano-Structured Polymeric Materials, Biopolymers.

LABORATORY FACILITIES

Laboratories of CPSE are well equipped with various sophisticated instruments in the area of Polymer Synthesis, Characterization, Testing, and Processing. The facilities include TEM, VNA Optical Microscopes, FTIR Spectrophotometer, Zwick MTS, Differential Scanning Calorimeter, Thermogravimetric Analyzer, Capillary Rheometer, Rotational Rheometer, Twin screw Extruders, Compression Moulding Machine, Injection Moulding Machine, Micro Computing, Micro Injection Moulding, Polarising Microscope, Two Roll Mill, Tool Grinding Machine, Mettler Hot Stage, Brookfield Viscometer, Small Angle Light Scattering Set up with Laser Source, Impedance Analyser, Lab scale Film Blowing Unit, Haake Rheocord, Charpy and Izod Impact tester, Melt Flow Indexer, Gel Permeation Chromatograph, Dynamic Mechanical Analyser, Mold Flow 3D Analysis, Glovebox, Nano-particle size analyzer, spectrophotometer, Friction Tester, Electrosopining.



CENTRE FOR

RURAL
DEVELOPMENT
AND
TECHNOLOGY





Vijay V.K., Ph.D. (IIT Delhi)

Professor

Renewable Energy, Biogas Enrichment and Bottling, Animal Power, Rural Industrialization, Waste Management Systems, Cow Products (Panchgavya).

Head of the Centre



Malik Anushree, Ph.D. (IIT Delhi)

Associate Professor

Food & Environmental Microbiology, Bioremediation, Biopesticides, Anti-microbial agents, Housefly control, Algal biofuels, Phycoremediation.

Santosh Satya, Ph.D. (IIT Delhi)

Professor

Food quality and safety, Bamboo technology, Botanical pesticides, Rural Energy-Environment Systems, Solid Waste Recycling, Sustainable Agricultural System.



Chariar V.M., Ph.D. (IIT Delhi)

Associate Professor

Design for Sustainability, Traditional Knowledge Systems, Appropriate Housing and Ecological Sanitation, Wisdom-based Leadership.

Sharma Satyawati, Ph.D. (IIT Delhi)

Professor

Biofertilizers, Biopesticides, Tissue culture, Rapid composting and Waste management, phytoremediation Nutraceutical mushrooms, Bioethanol.



S.N. Naik, Ph.D. (IIT Delhi)

Professor

Oils, Fats and Waxes Technologies, Super Critical Fluid Extraction of Natural Products, Bio fuels, Minor Forest product.

Rajendra Prasad, Ph.D. (IIT Delhi)

Emeritus Professor

Rural Energy Systems, Improved Cookstoves, Rural Industrialization, Leather, Pottery, Carpet Making, Food Processing, Milk Processing.



Hariprasad P., Ph.D. (Univ. of Mysore)

Assistant Professor

Environmental Microbiology and Biotechnology
Microbial Biopesticide and Biofertilizer
Bioethanol, Mycotoxins.

Associate / Joint Faculty

M.R. Ravi, Ph.D. (IISc., Bangalore)

Mechanical Engineering

T.R. Sreekrishnan, Ph.D. (IIT Delhi)

Biochemical Engineering and Biotechnology

P.M.V. Subbarao, Ph.D. (IIT Kanpur)

Mechanical Engineering

S.K. Khare, Ph.D. (IIT Delhi)

Chemistry

K.K. Pant, Ph.D. (IIT Kanpur)

Chemical Engineering



Jatindra K. Sahu, Ph.D. (IIT Kharagpur)

Assistant Professor

Dairy Engineering, thermal & non-thermal processing of food materials, biopackaging, value addition to agro-commodities, on-farm technologies for agriculture produce.

INTRODUCTION

The Centre for Rural Development and Technology (CRDT) was established to coordinate and provide inputs for scientific and technological advancements in the rural sector by giving technical back-up for the sustainable rural development and create replicable models for the nation and world at large.

The mandate of CRDT is to identify problems of the rural sector requiring science and technology inputs and solve these within the paradigm of sustainable development involving the faculty and students. The centre aims to generate a sustainable technology base by blending appropriately modern 'S&T' with traditional knowledge and wisdom. The centre also undertakes appropriate teaching, research, information dissemination and outreach related activities and network with other technical institutions, NGOs, government agencies, and rural/SSI industries, for achieving rural industrialization and improve the quality of life in rural areas.

ACADEMIC PROGRAMMES

UNDERGRADUATE

The Centre offers one elective course to undergraduate students.

POSTGRADUATE

The Centre offers seventeen courses in rural development and technology to postgraduate students as electives.

RESEARCH AREAS

The main research areas of the centre are:

Biomass and Environment: Biomass Production, Conversion and Utilization, Biomanures and Biopesticides, Bioremediation & Effluent Treatment, Solid Waste Management, Wasteland Reclamation, Ecological Sanitation, Nitrate and Phosphate Recovery.

Rural Energy: Biogas Production, Enrichment and Bottling, Algal biofuels, Biodiesel, Draught Animal Power, Biomass Gasifiers, Biomass Cookstoves, Engine Conversion Kits, Picohydel Systems, Rural Energy Systems.

Food and Natural Products: Sustainable Food Production System, Pesticide Residues, Food quality and Safety, Botanicals for Grain Storage System, Low Cost Milk Processing & Value Addition, Non-Timber Forest Products, Medicinal and Aromatic Plants & Nutraceuticals, Ethno-veterinary Medicine.

Rural Engineering and Sustainable Habitat: Bamboo Bow Beams, Columns & other Housing Elements, Engineered Bamboo Structural Elements, Bamboo Composites, Bamboo Boards and Laminates, Improved Artisanal Tools, Value-added Craft Products

LABORATORY FACILITIES

The major research laboratories are:

- **Applied Microbiology Lab**
- **Biogas Lab & Test Centre**
- **Biomass Laboratory**
- **BioChem Lab**
- **Ecological Sanitation Lab**
- **Bamboo Composites Lab**
- **Food Quality and Safety Lab, Agro Ecology Lab**
- **Regional Testing and Knowledge Centre for Clean Cookstoves**
- **Supercritical Fluid Extraction Lab**
- **Food Engineering Lab**
- **Agro-Food Processing Lab**
- **Environmental Microbiology and Biotechnology Lab**



Doctoral research is being carried out in the following area:

Biogas for vehicular application, Valorisation of food waste to biogas (VALORGAS), Optimization of biomethanation process for mixed feed digestion in various biogas reactors, Biogas enrichment and bottling, Development of low cost Biogas upgradation and bottling, Biogas slurry management, Phycoremediation and Algal biofuels, Fungal formulation for metal/dye removal from effluents, Housefly Control, Antimicrobial Agents, Biopesticidal formulations for termites, nematodes, plant pathogens and stored grain pests, Rapid composting through native earthworms & bioinoculants, Silvipastoral systems, Waste land development and value added products for housing, food, fodder & biofuel, Production of Biodiesel and Biolubricants from non-edible oil seeds, Extraction of Value added Chemicals by using Supercritical Fluid Processing Technology, Improved cook stove design and testing, Ecological sanitation: Nutrient recovery and recycling, Waterless urinals, Bamboo as a Green Engineering Material.



**NATIONAL
RESOURCE
CENTRE**

FOR

**VALUE
EDUCATION IN
ENGINEERING**



Sangeeta Kohli, Ph.D. (IISc., Bangalore)
Professor
Mechanical Engineering

Head of the Centre

V.M. Chariar, Ph.D. (IIT Delhi)
Joint Faculty
CRDT

Santosh Satya, Ph.D. (IIT Delhi)
Joint Faculty
CRDT

Kiran Seth, Ph.D. (Columbia Univ.)
Emeritus Professor
Mechanical Engineering



Sneh Anand, Ph.D. (IIT Delhi)
Biomedical Engineering

Shweta Agrawal, Ph.D. (Texas Austin)
Computer Science and Engineering

S. Balaji, Ph.D. (Stanford Univ.)
Applied Mechanics

Shubhendu Bhasin, Ph.D. (Univ. of Florida)
Electrical Engineering

G. Bhuvaneswari, Ph.D. (IIT Madras)
Electrical Engineering

P.R. Bijwe, Ph.D. (IIT Delhi)
Electrical Engineering

Nomesh Bolia, Ph.D. (Univ. of North Carolina)
Mechanical Engineering

Niladri Chatterjee, Ph.D. (Univ. of London)
Mathematics

Harish Chaudhary, Ph.D. (IIT Delhi)
Management Studies

Devendra K. Dubey, Ph.D. (Purdue University)
Mechanical Engineering

Rahul Garg, Ph.D. (IIT Delhi)
Computer Science and Engineering

Amit Gupta, Ph.D. (Univ. of Central Florida)
Mechanical Engineering

S.K. Gupta, Ph.D. (IIT Delhi)
Computer Science

Amit Kumar Jain, Ph.D. (IIT Guwahati)
Electrical Engineering

Manjeet Jassal, Ph.D. (IIT Delhi)
Textile Technology

Saroj Kaushik, Ph.D. (IIT Delhi)
Computer Science and Engineering

Uday K. Khankhoje, Ph.D. (California Institute of Technology)
Electrical Engineering

Jyoti Kumar, Ph.D. (IIT Guwahati)
IDDC

Anushree Malik, Ph.D. (IIT Delhi)
CRDT

Samrat Mukhopadhyay, Ph.D. (IIT Delhi)
Textile Technology

Bhanu Nandan, Ph.D. (Kanpur Univ.)
Textile Technology

Rajesh Prasad, Ph.D. (Cambridge Univ.)
CRDT

Rajendra Prasad, Ph.D. (IIT Delhi)
CRDT

P.V. Madhusudan Rao, Ph.D. (IIT Kanpur)
Mechanical Engineering

M.R. Ravi, Ph.D. (IISc., Bangalore)
Mechanical Engineering

Anjan Ray, Ph.D. (Michigan State Univ.)
Mechanical Engineering

S.K. Saha, Ph.D. (McGill Univ.)
Mechanical Engineering

Kushal K. Shah, Ph.D. (IIT Madras)
Electrical Engineering

Kamlesh Singh, Ph.D. (Univ. of Rajasthan)
Humanities & Social Sciences

Parag Singla, Ph.D. (Washington Seattle Univ.)
Computer Science and Engineering

Rajiv Srivastava, Ph.D. (KTH, Sweden)
Textile Technology

D. Sundar, Ph.D. (Pondicherry Univ.)
Biochemical and Biomedical Engineering

V.K. Vijay, Ph.D. (IIT Delhi)
CRDT

INTRODUCTION

National Resource Centre for Value Education in Engineering (NRCVEE) was setup in 2001. The role of the Centre is to create awareness in the technical community about human values. Accordingly, the mandate of NRCVEE is to identify, develop and disseminate techniques by which engineering students and practicing engineers can be motivated to imbibe human values and appreciate their impact on technology development, professional ethics and human welfare.

ACADEMIC PROGRAMMES

The Centre offers elective courses for UG and PG students. The Centre runs a Ph.D. programme to support interdisciplinary research on topics that pertain to the impact of science and technology on human values and professional ethics and vice-versa. The Centre also provides a platform for faculty from across the institute to engage with students through projects, courses and other activities so as to develop better understanding of issues related to human values and technology. The Centre acts as a catalyst in the activity of sensitizing the campus community at large to these issues through lectures by eminent personalities. It also organizes several workshops on meditation, self-enquiry and the like for students and other campus residents.

RESEARCH

The Centre supports research primarily through its Ph.D. program in the following areas: Philosophy of Values, Professional Ethics, Integration of Science, Technology and Human Values, Values and Traditional Knowledge, Values for Sustainable Development, Excellence in Engineering, strategies for Value Inculcation, Wisdom-based Impersonal Leadership.

FACILITIES

The Centre has a unique collection of books and audio-visual material on topics pertaining to science, spirituality, human values and ethics. It also has a meditation room that can accommodate 30 people and is open to students and all campus residents.



BHARTI
SCHOOL

OF

TELECOM
TECHNOLOGY
&
MANAGEMENT



Shankar Prakriya, Ph.D. (Univ. of Toronto)
Professor
Cooperative communications, Cognitive radio,
Signal Processing for Communications.

Coordinator

Associated from Electrical Engineering Department

Manav Bhatnagar, Ph.D. (Univ. of Oslo)
Ranjan Bose, Ph.D. (Univ. of Pennsylvania)
Shouribrata Chatterjee, Ph.D. (Columbia Univ.)
Santanu Chaudhury, Ph.D. (IIT Kharagpur)
Swades De, Ph.D. (State Univ. of New York)
Subrat Kar, Ph.D. (IISc., Bangalore)
V.K. Jain, Ph.D. (IIT Delhi)
S.D. Joshi, Ph.D. (IIT Delhi)
Uday Khankhoje, Ph.D. (California Institute of Technology)
Brejesh Lall, Ph.D. (IIT Delhi)
Ranjan K. Mallik, Ph.D. (Univ. of Southern California)
Saif K. Mohammed, Ph.D. (IISc., Bangalore)
B.K. Panigrahi, Ph.D. (Univ. of Sambalpur)
Jun Bae Seo, Ph.D. (University of British Columbia)
Kushal K. Shah, Ph.D. (IIT Madras)
Seshan Srirangarajan, Ph.D. (University of Minnesota, USA)

Associated from Management Studies Department

Harish Chaudhary, Ph.D. (IIT Delhi)
Arpan Kumar Kar, (Fellow, XLRI)
P. Vigneswara Ilavarasan, Ph.D. (IIT Kanpur)
S.K. Jain, Ph.D. (IIT Kanpur)
Mahim Sagar, Ph.D. (IIITM, Gwalior)
Ravi Shankar, Ph.D. (IIT Delhi)
S.S. Yadav, Ph.D. (Paris University)

Associated from Computer Science and Engineering Department

M. Balakrishnan, Ph.D. (IIT Delhi)
Kolin Paul, Ph.D. (BEC, Kolkata)
Vinay Ribeiro, Ph.D. (Rice Univ.)
Huzur Saran, Ph.D. (Univ. of California)
Aditeshwar Seth, Ph.D. (Univ. of Waterloo)

Associated from Mechanical Engineering Department

Nomesh Bolia, Ph.D. (Univ. of North California)

Associated from CARE Department

Monika Aggarwal, Ph.D. (IIT Delhi)
Mahesh Abegaonkar, Ph.D. (Pune Univ.)
Ananjan Basu, Ph.D. (Univ. of California)
S.K. Koul, Ph.D. (IIT Delhi)

Associated from Mathematics Department

S. Dharamraja, Ph.D. (IIT Madras)

INTRODUCTION

The Bharti School of Telecommunication Technology and Management (BSTTM) has faculty from Department of Electrical Engineering, Computer Science & Engineering, Mechanical Engineering, Management Studies, as well as the Centre for Applied Research in Electronics.

The Bharti School was set-up in the year 2000 with a grant from Bharti Enterprises with the following objectives:

- To be a centre of excellence for education and research relating to all facets of Telecommunication Technology and Management.
- To host state-of-the-art laboratories and infrastructures, and to provide research environment that attracts the best faculty and students.
- To invite and encourage the best talent in telecommunications to be a part of the activities of the School.
- To run graduate academic programs (including M.S. (R), M.Tech., MBA, Ph.D.) in collaboration with the various Departments and Centres at IIT Delhi.
- To run continuing education programs for personnel of the Telecom Industry.

The Bharti School also includes the Airtel IIT Delhi Centre of Excellence in Telecommunication (AICET), with a mandate of contract research. Global Internship Programmes and Distance Education.

ACADEMIC PROGRAMME

The school offers the following post-graduate programmes:

MASTER OF TECHNOLOGY (JTM)

The M.Tech. (Telecom Technology and Management) programme is of 2 years (4 semester) duration. Full-time, part-time and sponsored category students are considered. This is a unique program, and prepares students for industry while providing them a solid foundation in telecommunications.

MASTER OF SCIENCE (RESEARCH) (BSY)

M.S. (Research) is a two-year programme for full-time students and three-year programme for part-time students. Its emphasis is on research, with the thesis carrying 2/3rd of the credits.

DOCTOR OF PHILOSOPHY (BSZ)

Ph.D. full-time admissions are based on performance in M.Tech./B.Tech. as well as GATE Scores. Part-time admissions require 2 years experience in lieu of GATE scores. Students can work in broad area of communications and signal processing, or in various management aspects like telecom policy, regulation, pricing etc.

MASTER OF BUSINESS ADMINISTRATION (SMT)

The MBA (with focus on Telecom Systems Management) is a 2 years (4 semesters) programme. It is designed to be convenient for practising professionals, with most classes scheduled in the morning or evening.

LABORATORY FACILITIES

TEACHING LABS:

Telecom Software Lab:

Telecom Software Lab is proud to be Bharti School's first eco-friendly lab - first workspace to adopt all-LED/CFL lighting! This secure-access monitored lab is open for student access on 24/7/365 basis and provides 50 dedicated workstations for computational support to Bharti School students. Apart from these workstations, the lab also hosts four Quad Xeon CPU / 4 GB RAM Compaq servers and one 8-CPU / 16 GB RAM Dell Server. This lab supports Free Open Source Software - Linux (Ubuntu) on all the workstations and servers. The other equipment / facilities include providing software support for thin client architecture for entire school and IDE-Forte / Netbeans, Eclipse, UML-Poseidon, TTCN / MSC, CFSM-Esterel / Polis, Ptolemy, Telelogic / DOORS & TelelogicTau and Opnet. In addition, the lab supports the entire Bharti School by hosting 2x30 KVA 1:1 redundant UPS and hosting and maintaining 250 port network switching racks for Bharti School.

Wireless Research Lab:

The lab possesses : Spectrum Analyzers, Function Generators, Signal Generators, Network Analyzers, Antenna Measurement Kits, Simulation Software: CST Microwave Studio, Commsim and EDA, etc. It also hosts the Virtual Wireless Lab, an MHRD initiative.

Telecom Networks Lab:

This Eco-friendly Lab provides 50 personal dedicated workstations with dual screens for teaching and comprehensive computational support to Bharti School students in their course work. The other equipment / facilities include tool chains based on Free Open Source Software, FPGA design tools, V2Pro, Arduino Shields, DSOs with CAN/LIN triggering, NetFPGA based router design.

RESEARCH LABS

Research Project Lab:

The lab hosts projects related to multi-hop wireless communication and social media analyzer.

Pervasive Telecom Lab:

The pervasive telecom lab hosts several unique research initiatives. Central to the theme is the idea that telecom devices can be made ubiquitous, and deployed in numbers which are so large that data they gather is at a very high resolution. This data may be multi-dimensional but even with two dimensions - of space and time - it is extremely useful. The resulting Internet of Things and the Big Data flowing there from requires innovations in protocol stacks, hardware at layers 1, 2 and 3, in large distributed back-end repositories and in inference engines for the analytics. We have provisioned cloud repositories and have web-enabled several application domains such as healthcare, agriculture and animal management.

Internet of Things (IoT) Lab:

With increase in machine to machine communication, IoT along with virtualization technology, aims to establish

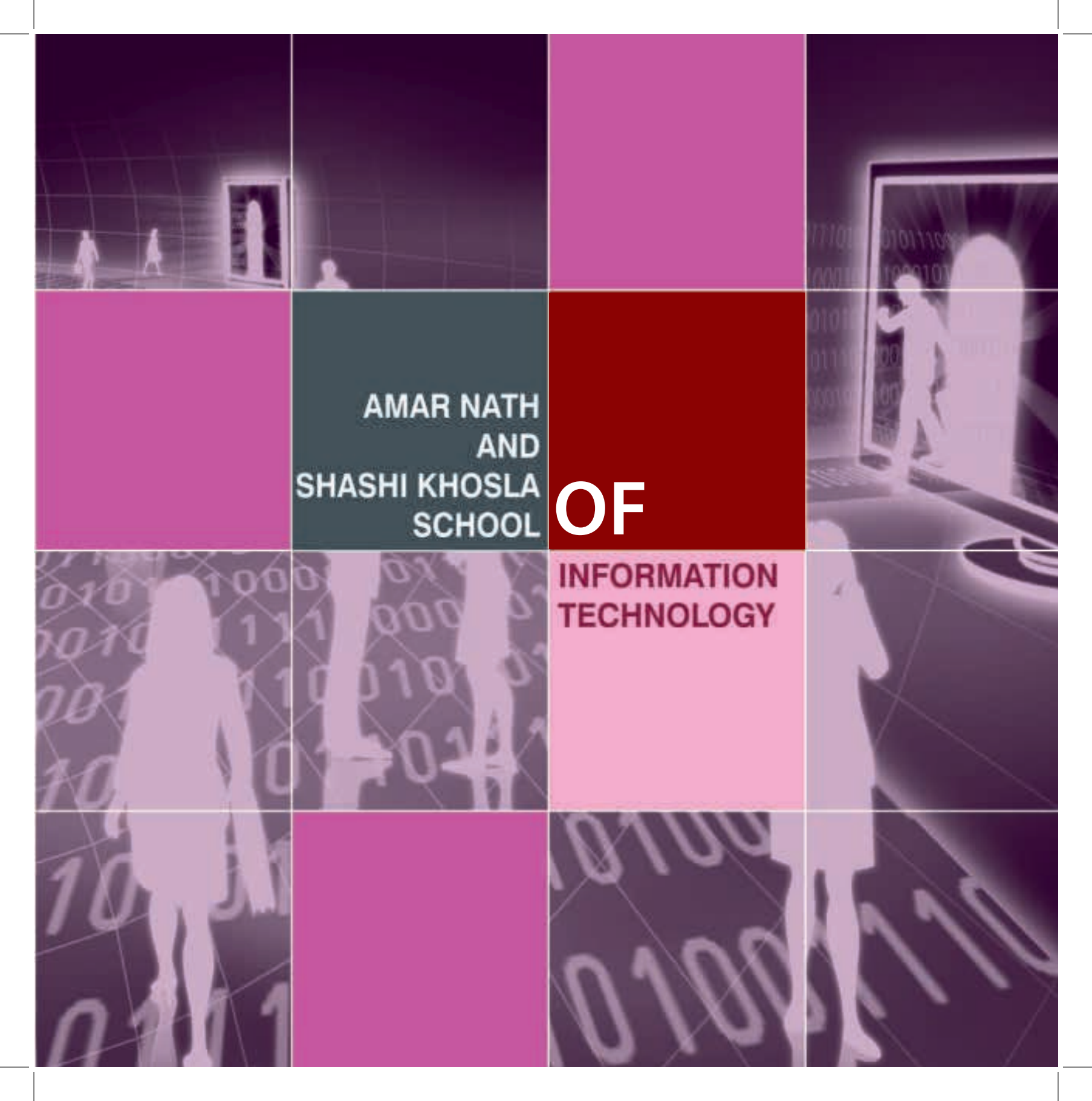
- A heterogeneous network where any device can plug in and starts using the services hosted by cloud service provider.
- Main research area is implementing a generic protocol where any remote device like smart car, smart phone, industrial instruments like sensors, etc. can connect to cloud server and can be managed centrally

Besides this a smart building concept will be developed utilizing location sensors and smart devices.

Next Generation Wireless Communication Lab:

The “Next Generation Wireless Communication Laboratory” is focused on developing next generation wireless communication technologies(e.g., Large and Massive MIMO technologies, Cognitive Radio technologies, Physical Layer Security, Energy harvesting, Green Communication, Device to Device communication, mmWave communication systems). Emphasis will be on building new wireless communication systems and development of new technologies. Facilities set up in this lab will aid technology development, and bring in large amount of research grants from government and industry. This lab is expected to become a leading wireless communication lab in India. It is expected to help faculty devote more attention to technology development and demonstration without taking away too much time from theoretical research. Through M.Tech/ B.Tech projects, students will also get trained in designing new communication technologies. This will lead to skill development which will satisfy industry needs.





AMAR NATH
AND
SHASHI KHOSLA
SCHOOL

OF

INFORMATION
TECHNOLOGY



M. Balakrishnan, Ph.D. (IIT Delhi)
Professor
 Assistive Technology, Embedded Systems Design,
 EDA and System Level Design,
 Computer Architecture.
 Department of Computer Science & Engineering

Coordinator

SCHOOL FACULTY



Sorav Bansal, Ph.D. (Stanford Univ.)
Assistant Professor
 Operating System, Compilers, Virtualization.
 Department of Computer Science & Engineering

Vinay Ribeiro, Ph.D. (Rice Univ.)
Associate Professor
 Computer Networks.
 Department of Computer Science & Engineering



Sanjiva Prasad, Ph.D. (Stony Brook Univ.)
Professor
 Distributed Systems, Programming Languages,
 Semantics, Verification, mHealth.
 Department of Computer Science & Engineering

Aaditeshwar Seth, Ph.D. (Waterloo Univ.)
Assistant Professor
 Computer Networks, Social Network analysis,
 ICT for Development.
 Department of Computer Science & Engineering



ASSOCIATED FACULTY

A.K. Gosain, Ph.D. (IIT Delhi)
 Integrated Watershed Modelling,
 GIS Hydrological Modelling,
 Irrigation Management, Environmental Impact.
 Department of Civil Engineering

Huzur Saran, Ph.D. (Univ. of California Berkeley)
 Wireless Networks, Network Performance Analysis, Algorithms.
 Department of Computer Science & Engineering

Anoop Chawla, Ph.D. (IIT Kanpur)
 CAD, CAE, Dynamics, Biomechanics,
 AI & Expert Systems for Design and Manufacturing.
 Department of Mechanical Engineering

K.K. Biswas, Ph.D. (IIT Delhi)
 Emeritus Faculty
 Computer Vision, AI.
 Department of Computer Science & Engineering

Anshul Kumar, Ph.D. (IIT Delhi)
 CAD of VLSI, Computer Architecture.
 Department of Computer Science & Engineering

Kolin Paul, Ph.D. (BESU)
 Embedded Systems, Reconfigurable Computing.
 Department of Computer Science & Engineering

B. Chandra, (Ms.), Ph.D. (Delhi Univ.)
 Distributed Databases, Neural Networks for NLP,
 Adaptive Control Models.
 Department of Mathematics

Mausam, Ph.D. (Washington, Seattle),
 Artificial Intelligence, NLP, automated planning, AI & crowdsourcing.
 Department of Computer Science & Engineering

Bijendra N. Jain, Ph.D. (Stony Brook Univ.)
 Computer Networks.
 BITS Pilani and Dept. of Computer Science & Engineering

Maya Ramanath, Ph.D. (IISc., Bangalore)
 Databases, Information Retrieval.
 Dept. of Computer Science & Engineering

M.P. Gupta, Ph.D. (IIT Delhi)
 MIS, e-Governance
 Department of Management Studies

Parag Singla, *Ph.D. (Washington, Seattle Univ.)*
Machine Learning, Statistical Relation Learning,
Social Network Analysis.
Department of Computer Science & Engineering

P.V.M. Rao, *Ph.D. (IITK)*
Product Design & Realization,
Computer Aided Design & Manufacturing.
Department of Mechanical Engineering

P.K. Kalra, *Ph.D. (EPFL, Switzerland)*
Computer Graphics, 3D Animation.
Department of Computer Science & Engineering

Rahul Garg, *Ph.D. (IIT Delhi)*
Medical Imaging, High-Performance Computing,
Algorithms and Game Theory,
Communication Networks.
Department of Computer Science & Engineering

S.N. Maheshwari, *Ph.D. (Northwestern Univ.)*
Algorithms, Parallel Processing,
Information Systems, Computational Biology.
Department of Computer Science & Engineering

Santanu Choudhury, *Ph.D. (IIT Kharagpur)*,
Computer Vision, Multimedia Systems,
Computational Intelligence.
Department of Electrical Engineering

ADJUNCT FACULTY

Ashish Suri, *M.Ch. Neurosurgery (AIIMS, Delhi)*
Professor, Department of Neurosurgery, AIIMS, Delhi
Skull Base Surgery & Micro-neurovascular Surgery, Endoscopic
Neurosurgery, Neuro-Oncology, Spine-Craniovertebral Junction,
Spinal Instrumentation & Image Guided Spine Surgery,
Neurosurgery Skills Training, Neuro-technology: Neurosurgery
Virtual Reality Simulation, Neurosurgery Instrumentation:
Research and Development.

Saroj Kaushik, *Ph.D. (IIT Delhi)*
Artificial Intelligence, Location Based Services.
Department of Computer Science & Engineering

Smruti Ranjan Sarangi, *Ph.D. (University of Illinois)*
Computer Architectures, OS Jitter Aware Systems,
Futuristic Storage Platforms.
Department of Computer Science & Engineering

Subhashis Banerjee, *Ph.D. (IISc., Bangalore)*
Computational Vision, Real Time Systems.
Department of Computer Science & Engineering

Subodh Kumar, *Ph.D. (Univ. North Carolina)*
Computer Graphics, Virtual Reality,
Visualization, Geometric Modelling.
Department of Computer Science & Engineering

Sumantra Dutta-Roy, *Ph.D. (IIT Delhi)*
Computer Vision and Image Analysis,
Pattern Recognition, Audio Data Retrieval
and Analysis, Biometrics and Bioinformatics.
Department of Electrical Engineering

Manik Verma, *D.Phil. in Engineering (University of Oxford)*
Machine Learning.
*Microsoft Research and Dept. of
Computer Science & Engineering*

Mahesh Chowdhary, *Ph.D. (The College of William and
Mary, Virginia)*
St. Microelectronics, Inc. USA GNSS, MEMS Sensors,
Wireless, Indoor Positioning, Mobile Devices.

INTRODUCTION

The Amar Nath and Shashi Khosla School of Information Technology was established with an endowment from the distinguished IIT Delhi alumnus, Vinod Khosla (B.Tech., EE 1976). The objective of the School is to foster inter-disciplinary, goal-oriented research, innovation and post-graduate education in information technology. The School undertakes research in several interdisciplinary areas where there is a significant application of Information Technologies. The School has its own supporting staff and students, and its own joint faculty but encourages the participation of faculty members and students from other departments who have an interest in novel applications of computing sciences and technologies.

ACADEMIC PROGRAMMES

POSTGRADUATE

The School offers Ph.D. and M.S. (Research) programmes in Information Technology.

The M.S. (Research) programme is a 2 year inter-disciplinary programme that admits students with various backgrounds. The school also develops and offers academic courses in a variety of application areas, for which interested students from diverse disciplines may enroll.

RESEARCH AREAS

Doctoral research is being carried out in:


Scalable & Dependable Computing, Information Security, Information Storage and Retrieval, High Speed Networks, Internet of Things, Multimedia Systems, Embedded Systems and Sensor Networks, HCI (Human Computer Interfaces), Image Processing, Biometrics, Computer Vision, Robotics and Intelligent Systems, Medical Applications of IT, Assistive Technologies, Computational and Systems Biology, Computational Neuroscience, ICT for Development, Geographical Information Systems, Mobile and Web Based Computing.

Also, students pertaining to disciplines other than those mentioned above can apply for SIT programmes and be admitted into them given that the synergy of these other disciplines can be established to the ongoing school activities.

LABORATORY FACILITY

The School has its own building, which houses specialized laboratories for collaborative and funded research activities.

- Assistive Technologies lab
- ICTD lab
- Medical Applications of IT lab
- Mobile & Machine to Machine lab

The background of the entire page is a grid of 12 squares. The central square (row 2, column 2) is a solid dark green and contains the text 'KUSUMA SCHOOL'. The square to its right (row 2, column 3) is a solid medium green and contains the text 'OF'. The square below 'OF' (row 3, column 3) is a solid light green and contains the text 'BIOLOGICAL SCIENCES'. The remaining squares in the grid feature a microscopic image of a plant cell with several long, thin spines extending from its surface, each ending in a small, rounded, bulbous tip. The overall color palette is various shades of green.

**KUSUMA
SCHOOL**

OF

**BIOLOGICAL
SCIENCES**



James Gomes, *Ph.D. (Tulane Univ.)*
Professor
Systems and Network Biology, Neurodegeneration.

Coordinator



Manidipa Banerjee, *Ph.D. (UCSD)*
Assistant Professor
Hepatitis A Virus Entry, Using Viruses as
Nanoparticles for drug delivery.

B. Jayaram, *Ph.D. (City Univ. NY)*
Professor
Computational Biology, Molecular Design.



Tapan K. Chaudhuri, *Ph.D. (Bose Institute)*
Professor
Chaperone Assisted Protein Folding, Protein
Engineering and Molecular Biophysics.

Bishwajit Kundu, *Ph.D. (Inst. of Microbial Tech.)*
Associate Professor
Protein Misfolding and Aggregation.



Archana Chugh, *Ph.D. (Delhi Univ.)*
Assistant Professor
Cell Penetrating Peptides, Marine
Bioprospecting, Plant-based Therapeutics.

Aditya Mittal, *Ph.D. (Drexel Univ.)*
Professor
Kinetics and Self Assembly in Biological Systems.



Chinmoy S. Dey, *Ph.D. (Jadavpur Univ.)*
Professor
Insulin Resistant (Type 2) Diabetes and
Leishmaniasis, Signal Transduction.

Vivekanandan Perumal, *Ph.D. (CMC Vellore)*
Assistant Professor
Hepatitis B Virus, Hepatocellular Carcinoma,
microRNA in Liver Cancer.



Seyed E. Hasnain, *Ph.D. (JNU)*
Professor
M.tuberculosis Molecular Epidemiology,
Functional Biology, New interventions and
diagnostics.

Ashok K. Patel, *Ph.D. (IMS, BHU)*
Assistant Professor
Biomolecular X-Ray Crystallography,
Molecular and Structural Virology,
Chromatin Remodeling and diseases.



INTRODUCTION

Modern biology has departed from emphasis on individual or species level understanding to appreciating unity in diversity at the genomic level. Work in modern biology is neither restricted to individual investigators nor to people trained in traditional disciplines considered under biological sciences. Rather, it has evolved into an inter- and multi-disciplinary quantitative science aimed at molecular, structural and systems level understanding of natural phenomenon that form the wonder considered 'life'. After serious national level deliberations, lasting over two years, it was decided that IIT Delhi was capable of providing the right integrative atmosphere and expertise to contribute significantly in taking the country forward in the area of modern biology.

The proposal to establish a School of Biological Sciences at IIT Delhi was approved by the Board of Education Research & Planning (BERP) on 23-3-2007, the Executive Committee of the Senate (29-3-2007), the Senate (19-4-2007) and the Board of Governors (28-6-2007). An Internal Task Force was set up (6-9-2007) chaired by Prof. B.N. Jain (Deputy Director, Faculty) to steer the establishment of the School. Following the recommendations of the above academic bodies, a high power national advisory committee (NAC), co-chaired by Prof. Surendra Prasad, Director, IIT Delhi and Prof. M. Vijayan, President, Indian National Science Academy, was constituted. In pursuance of the recommendations of the Task Force, Senate, BoG and the NAC, and the interest by some of the faculty members to join the School full-time, a duly constituted assessment committee selected a few faculty from within IIT Delhi for transfer to the School. The physical space for the School was allocated on the campus and these faculty members moved to the School of Biological Sciences on 27-12-2008. Subsequently, five new faculty members have joined the school.

The NAC suggested following theme research areas that could be pursued in the School of Biological Sciences at IIT Delhi: (a) Infectious and non-communicable disorders, (b) Cognitive and computational neurosciences, and (c) Engineering Biomaterials.

The core faculty members and the coordinator of the School are already established individually in one or more aspects of the research areas suggested by the NAC. The exciting and challenging part is to tie up individual expertise into a team effort that will result in high end research to carve a global niche for the School of Biological Sciences at IIT Delhi. In line with this, the core faculty members, along with the coordinator have created a vision and mission statement for the School.

Vision: To become the pioneers of modern interdisciplinary biological sciences by integrating emerging disciplines with biological sciences, and to nurture and sustain a vibrant comprehensive programme in research and instruction.

Mission: Promoting goal-oriented innovative interdisciplinary research by interfacing modern biology with applied engineering sciences to address problems affecting human health and welfare, and training scholars to be the next generation scientists.

ACADEMIC PROGRAMMES

Currently, the School offers a Ph.D. Programme M.S. (Research) and a Minor Area option in Biological Sciences for undergraduate students. The key strengths of these programmes are their multi- and inter-disciplinary perspective of biological sciences. The flagship UG course of the School is SBL 100: Introductory Biology for Engineers, a core requirement for all incoming UG students. This course, with a laboratory component, is aimed at introducing students to modern biology with an emphasis on evolution of biology as a multi-disciplinary field. Students are made aware of application of engineering principles in biology and how to engineer robust solutions inspired by biological examples.

Ph.D. Programme

In general, there will be no restriction on the background of the student in terms of the qualifying degree. However, it is expected that the student's prior academic career will demonstrate interest in the broad field of biological sciences. A student applying to the programme can have a B.Tech., B.E., M.Tech., M.E., M.Sc. or M.S. in any discipline of science and engineering. Interested/deserving candidates are encouraged to apply as per the procedures at the IIT Delhi admissions website. Selection of Ph.D. students is based on a written test (for the eligible applicants) followed by an interview (of those screened from the written test). The written test will



examine the analytical ability of students with examples from biology, and does not require memorization of any biological terminologies. A sample question paper is available on the School's website.

After admission to the Ph.D. programme, the background needed for carrying out research work by the students will be developed through a selection of courses from those developed for this Ph.D. programme, and from existing courses in the Institute. The courses for the Ph.D. programme will be evolving continuously with the aim of training the next generation of researchers in biological sciences. These courses will bring together a combination of experiment and theory for understanding how biological systems work from the cellular to the systems level.

Minor Area Programme: Academia and industry are realizing the rapid transformation of society driven by bio-based economy. The impact of biological sciences on all aspects of human life, particularly, healthcare and utilization of biodiversity for sustainable future, is evident. The creation of new technology and its management will need a new genre of skilled human resources knowledgeable in the field of biological sciences. Emerging technologies are now being created where biology meets the engineering sciences, physics, chemistry, computer science and mathematics. Engineering new materials and devices inspired by nature, engineering drug delivery systems are but a few of a plethora of opportunities arising at the interface of biological sciences. Keeping in view, the potential of biological sciences in various spheres of life, the School of Biological Sciences has floated a Minor Area programme for undergraduate students. Through this programme, a student will discover biology from an engineering science viewpoint. A student will have the opportunity to explore a variety of areas within the diverse field of biological sciences or specialize in a certain aspect of biological sciences by choosing courses in an area of interest.

DOCTORAL

In general, there will be no restriction on the background of the student in terms of the qualifying degree. However, it is expected that the student's prior academic career will demonstrate interest in the broad field of biological sciences. A student applying to the programme can have a B.Tech., B.E., M.Tech., M.E., M.Sc. or M.S. in any discipline of science and engineering. Interested/deserving candidates are encouraged to apply as per the procedures at the IIT Delhi admissions website.

The background needed for carrying out research work by the students will be developed through a selection of courses from those developed for this Ph.D. programme, and from existing courses in the Institute. The courses for the Ph.D. programme will be evolving continuously with the aim of training the next generation of researchers in biological sciences. These courses will bring together a combination of experiment and theory for understanding how biological systems work from the cellular to the systems level.

M.S. (RESEARCH)

The M.S. (Research) programme was initiated to enhance existing teaching and research activities being carried out by the School. Students will be trained on newer technologies currently desirable in the industry and academia. The technological focus on the M.S. (Research) programme would be to provide students with practical knowledge.

The School will admit students from different academic backgrounds and levels of preparation. The board guidelines for admission are:

- i) Bachelor's or Master's degree in any engineering discipline.
- ii) Bachelor's (four- year programme) or Master's degree in any Chemistry, Physics, Mathematics or Life Sciences.

The admission will be according to Institute rules once a year. A student may enroll as a full-time or a part-time candidate. Student admitted to the programme will be assigned course work according to the requirements of the research problem. The credits and the minimum CGPA requirements will be according to the Institute rules. The courses will be awarded to build the student's background and to impart knowledge in specific area. The student must take the all courses under the compulsory category and the remaining credits from the other courses of the School or relevant courses from the Institute. The research problems will be given by the faculty from their area of expertise. The student will complete the problem assigned by the supervisor, execute the research work and write ca thesis that merits the award of M.S. (Research) degree.

LABORATORY FACILITIES

The school has all facilities to carry out research in biological sciences. These include spectrophotometers, refrigerated tabletop centrifuges, ultracentrifuges, fast protein liquid chromatography (FPLC) and high pressure liquid chromatography (HPLC) systems, gel imaging and documentation equipment, PhosphorImager, cell culture facilities including hoods, incubators, and inverted microscope, CD machine, fluorimeter, real time PCR system for quantification of nucleic acids, ELISA washers and readers, confocal microscope for advanced cell biological studies. The new major equipment include FACS Aria III, Microarray platform comprising of Affymetrix system Gene chip 7G, Gene chip Scanner 3000 7G, Gene chip Fluidics Station, Gene chip Hybridization Oven, Real time PCR system (MX3000P), Lab chip GX, Zephyr genomics workstation and Cryo-EM system. In addition to all these, the school has the complete Discovery Accelrys software with licences for teaching and research. It has inter- and intra-net and dedicated access to the supercomputing computing facility of IIT Delhi.

INTERDISCIPLINARY RESEARCH PROGRAMME IN TRANSPORTATION RESEARCH AND INJURY PREVENTION (TRIPP)

TRIPP is an interdisciplinary programme focussing on the reduction of adverse health effects of road transport. TRIPP attempts to integrate all issues concerned with transportation in order to promote safety, cleaner air, and energy conservation. The Programme is recognized as a Centre of Excellence by the Ministry of Urban Development, Govt. of India. It is recognized as a WHO Collaborating Centre for research and training in safety technology. It is also recognized as a Centre of Excellence for Research on Future Urban Transport by the Volvo Research Foundation.

The programme has associated faculty from different departments / centres of the institute, viz., Applied Mechanics, Biomedical Engineering, Civil Engineering, Computer Science and Engineering, Mechanical Engineering, Humanities and Social Sciences, Mathematics. Experts from other organizations and hospitals in Delhi are also associated with TRIPP. TRIPP organises short-term courses and workshops on road safety and transport regularly every year.

The TRIPP research areas are: Transportation planning and traffic flow analysis for optimising mobility and minimising accidents and pollution; Vehicle crash modelling, road safety studies, safer vehicle and helmet design; Studies related to public transport, traffic management, road design and land use planning; Epidemiology of factors associated with road traffic injuries, injury analysis and pre hospital care; Studies on vehicle technology and engines to minimise fuel consumption and pollution. TRIPP also organises short-term courses and workshops on road safety and transport issues regularly.

ASSOCIATED FACULTY MEMBERS

Prof. Geetam Tiwari, Civil Engineering - Coordinator
Prof. Puneet Mahajan, Applied Mechanics
Prof. Sanjeev Sanghi, Applied Mechanics
Prof. Anupam Dewan, Applied Mechanics
Prof. A.K. Gosain, Civil Engineering
Dr. Arvind Swamy, Civil Engineering
Dr. K.N. Jha, Civil Engineering
Dr. Kalaga R. Rao, Civil Engineering
Dr. Gazala Habib, Civil Engineering

Prof. S. Banerjee, Computer Science & Engineering
Prof. Ambuj Sagar, Humanities & Social Sciences
Prof. V. Upadhyay, Humanities & Social Sciences
Prof. Ravi Shankar, Management Studies
Dr. Seema Sharma, Management Studies
Prof. Anoop Chawla, Mechanical Engineering
Dr. Nomesh Bolia, Mechanical Engineering
Prof. S. Mukhrjee, Mechanical Engineering
Prof. S.R. Kale, Mechanical Engineering
Prof. N. Chatterjee, Mathematics Department

OPTO-ELECTRONICS AND OPTICAL COMMUNICATION RESEARCH PROGRAMME

The programme is focused for research in the field of Fibre Optics and Optical Communication. Main participating departments / centres are Physics, Electrical Engineering, IDDC and CARE. This programme has received fundings from the Government agencies like MHRD, DST, DIT (formerly DoE), and DoT. In addition, R&D work has also attracted considerable international collaboration from universities in UK, France and National Institute of Standards and Technology in USA. The development work has led to commercialisation of a fibre optic educational kit and an erbium doped fiber amplifier.

The programme carries research in the following areas: analytical and numerical modelling of the propagation characteristics of optical fibres and integrated optical waveguides, design and simulation of novel in-line fibre optic components such as polarizers, directional couplers, and mode filters, characterisation of birefringent fibres, development of optical fibre-based sensors, nonlinear interactions in fibre and integrated optical waveguides, Optical Amplifier, Coherent optical communication, Optical Networks, QoS issues of WDM Networks, SONET / SDH, fiber in Access Networks, Erbium Doped Fibre Amplifiers (EDFA), Raman Fiber Amplifiers, Dispersion Compensating Fibres (DCF), Fibre Bragg Gratings (FBG), fibre optic sensors for civil engineering structures, photonic band gap fibres, free space optical systems, OCDMA systems, etc.

INTERDISCIPLINARY M.DES./M.TECH. PROGRAMMES

Besides a number of regular courses that are offered at the postgraduate level by the academic departments / centres, the Institute offers Interdisciplinary M.Tech. and one M.Des. programme which are managed by the Programme Executive Committees and Programme Advisory Committees that are constituted by nominating faculty from the concerned departments and centres. Each programme is looked after by the Programme Coordinator who is appointed by the Director.

MASTERS OF DESIGN PROGRAMME

The M.Des. programme caters to the requirement of industry for innovators and designers capable of creating high quality design of products for competitive markets. It is open only to graduates in Engineering and Architecture. The programme is of two years duration, and admission to the eprogramme is through CEED. It involves extensive studio work with hands on practice and is a project based, industry and consumer oriented programme. The thesis projects are often supported by the industry and there is close interface with the industry throughout the programme of study. The programme emphasizes development of free hand conceptualization skills, CAD modeling skills on mid level platforms and above all design thinking skills and detailing over a diverse range of products.

INTERDISCIPLINARY M.TECH. PROGRAMMES

The institute recognises and actively supports academic activities jointly conducted by faculty across the departments and centres. Such activities encourage teaching, research and industry/professional interactions, these are listed below. The Interdisciplinary Post Graduate programmes are in the following specializations:

Energy Studies: This programmes introduces students from different backgrounds to various aspects of energy, sources, fuels, energy conversion and energy systems amongst others. Commercial and non-commercial energy sources are covered.

Industrial Tribology and Maintenance Engineering: Various basic and applied aspects of tribology, including wear and maintenance engineering are covered in this programme. Students are introduced to diagnostic maintenance, reliability, availability and maintainability engineering as well as failure analysis.

Instrument Technology: This programme includes students to various instruments, electronic techniques for signal conditioning and instrument design. The electives cover a wide range of topics in instrumentation, electrical engineering, mechanical engineering and physics.

Opto-Electronics and Optical Communication: This programme is jointly offered by physics and electrical engineering departments. The courses cover a wide variety of basic and applied courses in fibre optics, optical-electronics and digital communication.

Polymer Science and Technology: Faculty from centre for polymer science and technology, and textile, mechanical engineering and chemical engineering are participants in this programme. The focus is on polymer chemistry, physics, processing, and engineering applications.

VLSI Design Tools and Technology: This programme is taught by the faculty of computer science and engineering, electrical engineering departments and CARE. The coursework includes courses on MOS, VLSI and VLSI design and VLSI system. The students gain proficiency in the use of state-of-art tools in VLSI design. The programme is largely supported by industries engaged in VLSI design.

Telecommunication Technology for Management: A set of courses in digital communication and systems, wireless communication and telecommunication management form the core of this programme. Faculty of electrical engineering and management studies departments participate in the teaching of this programme.

7. MAJOR CENTRAL FACILITIES

The Institute has following central facilities for smooth functioning of Academics, Research and Outreach.

- Central Research Facilities
- Industrial research and development (unit)
- Central workshop
- Training and placement (unit)
- Institute libraries

7.1 CENTRAL RESEARCH FACILITY (CRF)

Purpose and Aim of CRF

Central Research Facility (CRF) is a common instrument and fabrication facility of IIT Delhi created to primarily support the students in their research activities. CRF has state-of-the-art analytical instruments manned by qualified personnel to provide sample testing and analysis to UG, PG, Ph.D. students and other research staff. The facility is also made available, on payment basis, to other academic and research institutions, industries and organizations in the neighborhood.

The aims of CRF are:

- To provide expertise in the analytical sciences and to facilitate research on the structure and properties of Biological and other Material Systems, down to nanoscale.
- To foster enthusiasm and collaboration in scientific research.
- To strengthen the research-relevant infrastructure of basic science and technology and built a facility that represents a key commitment for preserving and raising the efficiency of research to top international standards.

Structure of CRF

The policies and activities of CRF are monitored by Central Facilities Committee (CFC), which is appointed by the Director and is chaired by DD (S&P). The constitution of the current CFC is as under:

Sr. No.	Official	Status	Nominee of
1	Dy. Director (Strategy and Planning)	Chairman	Director
2	Dy. Director (Operations)	Member	Ex-officio
3	Dean (R&D)	Member	Ex-officio

4	Associate Dean Academics (PG Research)	Member	Ex-officio
5	Prof. N.G. Ramesh (Chemistry Deptt.)	Member	Director
6	Prof. B. Kundu (KSBS)	Member	Director
7	Prof. P. Srivastava (Physics Deptt.)	Member	Director
8	Prof. S.K. Saha (Mech. Engg. Deptt.)	Member	Director
9	Prof. Ashwini K. Agrawal, Head, CRF	Member	Ex-officio
10	Prof. Sujeet Chaudhary, Assoc. Head, CRF	Convener	Ex-officio

The operations of CRF are managed by Head and Associate Head. They may be contacted at:

Head

Prof. Ashwini Kumar Agrawal
(Department of Textile Technology)

Tel: 011-26591415 **E-mail:** ashwini@textile.iitd.ac.in

Associate Head

Prof. Sujeet Chaudhary
(Department of Physics)

Tel: 011-26591341 **E-mail:** sujeetc@physics.iitd.ac.in

Various facilities under CRF

Central Research Facility is equipped with the following instrument and fabrication facilities.

1. Cryo HRTEM

The TEM facility at IIT-Delhi consists of a 200 KV TEM with a high brightness field-emission gun (FEG) source, which produces improved sensitivity and resolution compared to more traditional thermionic sources like LaB6 or Tungsten filaments. This facility can also be utilized for high resolution analysis of the structure and organization of large biological molecules such as protein complexes, viruses etc. through cryo electron microscopy.

Faculty Coordinator:

Dr. Manidipa Banerjee
(Kusuma School of Biological Sciences)

Tel: 011-26597538 **Email:** mbanerjee@bioschool.iitd.ac.in



Figure 1: Cryo HRTEM

2. Liquid Nitrogen

The Liquid Nitrogen (LN2) facility is involved in in-house production of LN2 and its supply to various experimental laboratories of the institute. The current LN2 plant was commissioned 1989 and subsequently upgraded in 2006. It has a production capacity of 8-10 liters/h. The plant is able to meet the current Institute's demand of approximate 1500 liters per month.

Faculty Coordinator:

Prof. Sujeet Chaudhary
(Department of Physics)

Tel: 011-26591341

E-mail: sujeetc@physics.iitd.ac.in



Figure 2 : Liquid Nitrogen Facility

3. Scanning Electron Microscopy (SEM)

Zeiss EVO 50 & EVO 18 are versatile analytical electron microscopes with a large specimen chamber. The EVO 50 series can handle large specimens at the analytical working distance of 8.5mm owing to a combination of the inclined detectors and the sharp conical objective lens. The class leading X-ray geometry allows for the addition of an EDS detector. The instrument can achieve 2.0 nm resolution.

Faculty Coordinator:

Prof. Kushal Sen
(Department of Textile Technology)

Tel: 011-26591411

E-mail: coordsem@admin.iitd.ac.in



Figure 3: Scanning Electron Microscopy (SEM)

4. Micro Raman Spectroscopy

Micro-Raman spectroscopy system, consisting of inVia reflex Raman spectroscope combined with research grade Leica make microscope, allows scatter, line, area mapping and confocal depth profiling measurements. Renishaw make Raman Spectrometer is equipped with two types of lasers- 514 nm and 785 nm with different magnification lenses.

Faculty Coordinators:

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(Department of Textile Technology)

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Prof. Manjeet Jassal
(Department of Textile Technology)

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Figure 4: Raman Spectrometer

5. FESEM + EDX

Quanta 200 FEG Scanning Electron Microscope (SEM) from FEI offers nanometer resolution and a high signal to noise ratio in both regular high vacuum and environmental modes. The EDS consists of 80 mm² SDD detector from Oxford (IE 250 X Max 80) that enables detection of elements under high resolution. Quanta FEG 200 comprises of different types of detectors, like ETD (Everhart-Thornley detector), Backscattered Electrons Detector (BSED), Large Field Detector (LFD), and Gaseous Secondary Electron Detector (GSED). STEM (Scanning Transmission Electron Microscopy) is also possible to form high-resolution images and high contrast imaging of biological samples.

Faculty Coordinators:

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Prof. Manjeet Jassal
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Figure 5 : FESEM with EDX

6. NMR 400 MHz with Liquid and Solid Probe

In JNM-ECA Series (Delta V4.3 -) Delta - 400 MHz- FT-NMR instrument, both liquid and solid-state NMR measurement are possible. High-Resolution solid-state NMR measurement by techniques such as cross-polarization-magic angle spinning (CP/MAS) method with a probe for the solid-state measurement attached to the standard JNM-ECA/ECX instrument. Multinuclear observation (^{31}P - ^{15}N) measurement and measurement under variable temperature (VT) are also possible in this system.

Faculty Coordinators:

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(Department of Textile Technology)

Tel: 011-26591426

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Figure 6 : NMR (400 MHz)

7. Inductively Coupled Plasma Mass Spectrometry (ICPMS)

Agilent's 7900 ICP-MS has a robust plasma and Ultra High Matrix Introduction (UHMI) technology that enables routine measurement of samples containing up to 25% total dissolved solids (TDS)—100 times higher than the traditional matrix limit for ICP-MS.

Widest dynamic range—the new orthogonal detector system (ODS) delivers up to 11 orders of magnitude dynamic range from sub-ppt to percent-level concentrations, enabling one to measure trace elements and majors in the same run.

Faster analysis of transient signals—with 10,000 separate measurements per second, the 7900 ICP-MS provides short integration times for accurate analysis of transient signals.

Faculty Coordinator:

Dr. Z.A. Shaikh

(Dept. of Biochemical Engineering and Biotechnology)

Tel: 011-26591006

E-mail: zia@iitd.ac.in



Figure 7 : ICP-MS system, Agilent 7900

8. Nuclear Magnetic Resonance Spectroscopy Lab

NMR Spectroscopy Lab is equipped with three superconducting NMR spectrometers operating in the liquid mode. The spectrometers range from 7.05 Tesla (300 MHz ¹H frequency) to 11.74 Tesla (500 MHz ¹H frequency). All three spectrometers are of the Bruker Avance AV-III type and are equipped with broadband probes with a single axis gradient. The 400 MHz spectrometer has an auto sampler for accelerated workflow.

Faculty Coordinator:

Prof. Narayanan Kurur
(Department of Chemistry)

Tel: 011-26591378

E-mail: nkurur@chemistry.iitd.ac.in

9. Glass Blowing Workshop

Various jobs undertaken in the workshop are: 'T' joints to mercury diffusion pumps; special glass apparatus, like B.E.T apparatus, Dewar flasks, distillation unit; various types of viscometers; all type of condensers, multi necked flasks, adapters; and setting up of vacuum lines, etc.

Faculty Coordinator:

Dr. Sameer Sapra
(Department of Chemistry)

Tel: 011-26591561

E-mail: sapra@chemistry.iitd.ac.in



Figure 8 : Glass Blowing Workshop

7.2 INDUSTRIAL RESEARCH AND DEVELOPMENT (UNIT)

The Indian Institute of Technology Delhi lays a strong emphasis on the Sponsored Research and Industrial interaction. The Industrial Research & Development Unit was specifically set up in the Institute to provide specialized administrative and managerial support for the operation of Sponsored Research Projects, Consultancy Jobs and other related research and development activities. Over the years, the Institute has set up many modern laboratories and supporting infrastructure through these projects.

The Institute has given due emphasis to jobs of varied nature like trouble shooting, product and process development, design checks and investigation of problems of direct relevance to the needs of the country through time-bound Sponsored Research Projects and Consultancy Projects. During April 1, 2015 to March 31, 2016, 135 new Sponsored Research Projects with a funding of Rs. 72.10 crores were undertaken. In addition, 360 Consultancy Jobs worth Rs. 28.69 Crores and 83 Miscellaneous Projects worth Rs. 27.95 Crores were also undertaken.

The Institute is actively involved in Collaborative programmes with national and international organizations/ universities and IRD Unit manages these projects and always look forward for projects of National importance and society improvement.

IRD has several schemes to encourage research and development among faculty and students. Few of them are listed below:

- One time grant of Rs. One Lac to new faculty Members who join the Institute.
- Chair Professorships.
- Summer Undergraduate Research Award (SURA).
- Assistantships/Fellowships to 5th year Ph.D. Students
- Open House

7.3 CENTRAL WORKSHOP

Central Workshop is one of the pivoting units of the institute which teaches conceptually “how” a product comes to its present form by way of imparting core manufacturing education to all the first year students of IIT Delhi. It also provides product manufacturing support to entire institute community in general and undergraduate students in particular. More than 900 undergraduate students in their first year acquire hands-on manufacturing skills in this Central Workshop. The Central workshop not only introduces art and science of manufacturing but also infuses confidence to take up product design and manufacturing activities in future. Central Workshop is

also a place where B.Tech. students of Mechanical Engineering and B.Tech students of Production & Industrial Engineering acquire training and knowledge in specialized areas of manufacturing like Metal Casting, Metal Forming, Metal Machining, Welding & Joining, Metal Forging Woodworking, CNC programming and 3D Printing, Plastic Product manufacturing etc. M.Tech. students of Production group also use central workshop facilities for their practical classes in various courses as well as for project and research work.

The central workshop is fully equipped with latest power tools, equipments and facilities in all areas of manufacturing technologies. It also caters to the fabrication needs of students doing product design & manufacturing courses, minor projects, B.Tech, project, Masters thesis and Doctoral research. Large numbers of students use this facility to build products and compete at national and international level product building competitions like Formula student car, mini Baja, Robocon etc. The facility can also be used by external agencies for their manufacturing and training needs during the vacation period.

Central workshop has undertaken efforts to reorganize, modernized and prepare it for continuously changing global manufacturing scenario. Efforts are also on to prepare students for a broader view of manufacturing which involves planning and deploying optimum ways to transformation of raw material into goods by integration of people, capital, processes, systems and enterprises to deliver products of value to the society.

A new shop 'CNC Learning' is created in 2013-14 to imbibe product realization through computer generated geometries. A rapid prototype model can also be visualized by use of state of art 3D Printing technology in this new shop of Central Workshop.

7.4 TRAINING AND PLACEMENT UNIT

The Training and Placement unit actively interacts with industrial, management and research organisations in the country with the dual aim of ensuring that the students are given adequate technical exposure / industrial training during their pre-final year and subsequently enabling them to get employment in organisations.

Training

Students of B.Tech., Dual Degree, and Integrated Programmes, can opt for practical training during summer vacations / during semsters in partial fulfilment of their Design & Practical Experience (DPE) component requirements. The Training and Placement unit facilitates the placement of students in Industry and Research Laboratories for this purpose.

Placement

An active and dynamic programme of securing jobs for students graduating from the Institute is initiated by

inviting industries of repute and other organisations to conduct interviews. Wide publicity of the academic and extra-curricular activities is given to the organisations.

Organisations that have hitherto not participated in Training or Placement of the students are contacted actively.

Support Services

The Training and Placement unit organizes lectures for students to supplement the above information with special talks. Workshops are organized on various subjects such as: career counselling, interview techniques and modes of communication.

7.5 INSTITUTE LIBRARIES

The IIT Delhi Library System comprises of a Central Library and 18 departmental libraries that collectively support the teaching, research and extension programmes of the Institute. All students, faculty and employees of the Institute are entitled to make use of the Library facilities. The Alumni of the Institute are also entitled to Library services provided they are members of the Institute's Alumni Association. Similarly, industrial establishments can avail the Library services on taking corporate membership of the Library. Library consultation facilities are extended to faculty, students of outside organizations and the wards of IIT faculty and staff on their request. Retired teaching and non-teaching staff members can also avail Library facilities. The Library has over 9500 registered members.



Video Surveillance integrated with the RFID based library system



RFID based Wireless Inventory Management System

LIBRARY HOURS

The Library remains open throughout the year except on six days, namely; Republic Day, Independence Day, Dussehra, Diwali, Holi, Mahatma Gandhi's Birthday and any other holiday declared as a special holiday. The book stack area at 1st floor and Ground floor is open from 9:00 AM to 9:00 PM (Weekdays) and 10:00 AM to 6:30 PM (Weekends & Holidays). Reading Area at Ground floor and 2nd Floor is open 24x7.

LIBRARY RESOURCES

Collection

The Central Library, IIT Delhi has a strong collection pertaining to physical sciences, engineering and technology, biotechnology, computer and information technology, social sciences and management.

Video Library

The Library is equipped with video viewing facility and has a collection of more than 2,500 CDs and kept in the Computer Application Division of the Central Library for viewing.

Reference Collection

The Library maintains a separate reference collection consisting of encyclopedias, dictionaries, handbooks, technical data, almanacs, atlases, bibliographies, etc.

Hindi Collection

The Central Library has built up a good collection of books in Hindi. Books in Hindi include books on various subjects being taught and researched at the Institute as well as books on literature in Hindi. Books in Hindi are prominently kept near the reference area in the Library to promote its usage. To increase the use of Rajbhasha Hindi, Central library offers borrowing facility of one extra Hindi Book to all its members apart from their entitlement.

ELECTRONIC JOURNALS AND ONLINE BIBLIOGRAPHIC DATABASES

The Institute have access to over 20,000 full-text electronic journals and 8 bibliographic databases from a number of publishers and aggregators through the Direct subscription/access through INDEST-AICTE Consortium/through eShodh Sindhu. The INDEST-AICTE Web Site (<http://paniit.iitd.ac.in/indest/>)/eShodh Sindhu Web Site (www.inflibnet.ac.in/ess/) hosts search and browse interface to locate these journals and their URLs. These journals/databases are also accessible online from the publishers' web site. Links to these electronic journals are

available through the Library web site as well through the Library Web OPAC. More than 1 lakh bound volumes of journals are available in print form.

E-RESOURCES AVAILBLE THROUGH THE CENTRAL LIBRARY/INDEST-AICTE CONSORTIUM/ESHODH SINDHU

- AAAS – Science Online & Science Classics
- ABI / Inform Complete
- ACM Digital Library
- ACS Archives
- AIP Journals
- American Mathematical Society Journals
- American Meteorological Society Journals and Archives
- Annual Reviews
- APS Journals
- ASCE Journals
- ASCE Proceedings
- ASME Digital and Archives
- ASME Journals (+ A M R)
- ASTM Standards & Digital Library
- Cambridge University Press - HSS and S&T package
- Capitaline
- EBSCO - Business Source Complete
- EBSCO – World Textiles
- EBSCO Discovery Services
- EBSCO - Textile & Technology Complete
- Electrochemical Society - Digital Library Package
- Elsevier's Science Direct
- Emerald Full-text
- Euromonitor (GMID)
- I.C.E. and their Archives

- IEEE / IEE Library Online (IEL)
- InCites
- Indiatat.com
- INFORMS Current Journals
- INSIGHT
- IoP Science extra and their Archival collection
- ISI Emerging Markets - EMIES
- ISID
- Jgate+JCCC
- JOVE Biology
- JOVE Physics
- JSTOR
- Lecture Notes in Computer Science, Mathematics and Physics (Vol.1/1969-Vol. 476/1996)
- MathSciNet
- Nature
- NOW Journals
- Online Miscellaneous Journals
- Optical Society of America (OSA)
- Oxford Journals (Mathematics, Life Science, Humanities and Social Science)
- Project MUSE Journals
- RSC GoldOnline
- RSC Journals Archive Titles (1841 - 2004)
- Sage - IMECH Collection
- Sage - HSS & Management Journals and their Archives
- Sage – Science and Technology Package
- Science (Current and Archives)
- Scientific American
- Scopus
- SIAM Journals and their Archives
- Springer Link

- Taylor & Francis, Current Core Science & Technology Titles+ Chemistry Backfiles
- Wiley Custom Package
- World Scientific Publication Mathematics
- World Textiles Information Network

ELECTRONIC BOOKS

The Institute has access to electronic books from the following publishers / aggregators:

- Elsevier Book Series on Chemistry, Business, Management & Economics, Life Sciences and Methods in Enzymology through the Science Direct (<http://www.sciencedirect.com>)
- Springer's Electronic Books (about 100 e-books) (<http://ebooks.springerlink.com>)
- Wiley InterScience Electronic Books (about 100 e-books)
- Mylibrary
- E-Text Books (38 books)

COMPUTER AND NETWORKING FACILITIES

The Library has its own sub-LAN, which, in turn, is connected to the Campus LAN. It has over 100 PCs and six servers spread over three floors of the Library.

The Library is a part of fibre optic-based campus-LAN. Of 100 PCs in the Library, 40 Internet-enabled PCs are exclusively devoted for the Library users. As a member of the DELNET, the users can access databases offered by the DELNET. The Library Home Page provides a link to the DELNET database.

COMPUTERIZATION OF IN-HOUSE ACTIVITIES

All in-house activities in the Library including Acquisition, Cataloguing, Circulation and Serials Control are fully computerized using Libsys Software Package. The Online Public Access Catalogue (OPAC) of the Library is operational both on Intranet and Internet. It can be accessed online to search more than 1,75,000 bibliographic records, available in the Library database through a web-based search interface or with a window client of the Libsys on Intranet as well as on Internet. The editing and updation activities are done on regular basis. Besides, the Central Library has two in-house databases for specialized collections. These databases include: Database of Ph.D. theses submitted to the IIT Delhi and Database of research articles by the faculty and researchers of the Institute.

The Library uses bar-code technology for computerized circulation system. Every document in the Library (except reference sources and bound volumes of journals) bear a bar-code tag that facilitates identification of document and the borrower in the circulation process. Similarly, all categories of users have a bar-coded patron cards. The Library has developed in-house facility for bar coding of books and patron cards.

RFID TECHNOLOGY IN THE LIBRARY

The Library also has the Radio Frequency Identification (RFID) based system. It is the best automated library automation system used world wide and is an effective way of managing collections of the library and providing enhanced services to the users having benefits like: self check-out of books, self-check-in (book drop), to control theft, to find misplaced reading material, sorting, inventory accuracy, stock verification procedures, security control, video surveillance, people counter, Smart Card issuance, etc. It is an automatic data capture technology that uses tiny microchips and miniature antennas affixed to documents. RFID plays a vital role in redefining the library processes to make everyone's job easier right from the users to library staff.

LIBRARY SERVICES AND FACILITIES

Reader's Assistance

The Library provides assistance to its users ranging from location of a book to finding specific information required by a user. A suggestion book is maintained with Incharge, Reader's Services where the users of the Library can suggest measures for improvements in its facilities and services.

Circulation of Books and Library Membership

The Library members, according to their borrowing category can borrow stipulated number of books at a time against their bar-coded/RFID patron card.

Inter Library Loan (ILL) and Resource Sharing Facility

The Library arranges books and journals from other libraries in Delhi on Inter Library Loan (ILL). Photocopies of research articles are also arranged from other IITs under a resource sharing agreement signed by all IITs. The Library also facilitates Demand based procurement of research publications, photocopies of research articles, etc. from other IITs and institutions in Delhi as well as from other parts of India on reciprocal basis.

Database of Ph.D. Theses Submitted to the IIT Delhi

The library has in-house design and developed Ph.D. theses database. Contains approximately 5000 bibliographic records of Ph.D. theses submitted to the IIT Delhi. In the year 1966 the first Ph.D. has awarded after

that number of Ph.D. research has been continuously increasing every year till dated. The Database developed and maintained in MySQL Database and programmed using PHP language to facilitate access on the Intranet and Internet.

Photocopying Facility

The Library provides photocopying facility within its premises through an external vendor on payment basis.

Book Bank Facilities

The Book Bank holds multiple copies of selected textbooks for making them available to the students for the entire period of a semester.

Text Books Facilities (Print and Online)

The text books are most useful collection of the library especially for course/syllabus related reading. The section has approximately 10,000 syllabus related text books. The books for this section are purchased generally on the recommendations from different faculty members through the concerned Heads of the Department. The timings for issuing the books from the Text Book Section are from 2 p.m. to 5 p.m. during Monday to Friday and the same are issued for overnight only (for one day). The books of this section may be returned back during 9 AM to 1 PM only. A maximum total of 2 of books are issued from the section at a time. The Central Library also has 35 e-textbooks for undergraduate students and the same are accessible in the campus through library website - <http://library.iitd.ac.in/index.php/e-resourc/e-textbooks>.

Theses Consultation Facilities

Central Library receives all the Ph.D. Theses awarded by IIT Delhi in Hard copy along with their CDs. Print copies of theses are housed in Text Book & Book Bank Section located at the ground floor of the library for consultation purpose only. The abstracts of theses are made available through library Online Public Access Catalog (OPAC) - <http://libcat.iitd.ac.in:8080/jopacv11/html/> and also through another interface especially designed for searching the theses at: <http://library.iitd.ac.in/thesis>.

WEB-BASED COMPUTERIZED SERVICES FROM THE LIBRARY

The Central Library offers the following services to the Institute:

Network-based CD ROM Search Services

The Library has complete collection of Indian Standards and ASTM Standards on CD ROM that is available on

the Campus network. The resources can be accessed on the Intranet at the URLs given below or through library website at <http://library.iitd.ac.in>:

Indian Standards	http://10.116.2.102/bis/
ASTM Standards	http://10.116.2.102/astm/
IEC Standards	http://10.116.2.102/iec/

Institutional Repository at IIT Delhi (<http://eprint.iitd.ac.in/dspace/>)

The Eprints @ IIT Delhi has been set-up to host full-text of research publications of faculty and researchers of the IIT Delhi using Dspace, an open source Digital Library software developed by the Massachusetts Institute of Technology. The Dspace supports the Open Archives Initiative's Protocol for Metadata Harvesting (OAI-PMH), an internationally recognized protocol and interoperability standard. The Eprints@IIT Delhi provides a platform for faculty and researchers to deposit, reuse and share their research publications. The repository also has the ability to capture, index, store, disseminate and preserve digital materials created in any part of the Institute. Faculty and researchers can register themselves with the digital repository and submit their pre-prints (pre-refereed version of an article), post-prints (post-refereed final version) and publisher PDFs (if allowed by the publisher). The repository has around 2,100 full-text research articles and 4800 abstract of Ph.D. Theses.

ADMINISTRATIVE STRUCTURE

THE VISITOR

Shri Pranab Mukherjee (Hon'ble President of India)

CHAIRMAN, BOARD OF GOVERNORS

Shri Kumar Mangalam Birla

DIRECTOR

Prof. V. Ramgopal Rao

DEPUTY DIRECTORS

Prof. Ashok Gupta (Operations) and Prof. M. Balakrishnan (Strategy and Planning)

Deans

Prof. Anurag Sharma : Academics

Prof. Kushal Sen : Faculty

Prof. Naresh Bhatnagar: Research and Development

Prof. Shashi Mathur : Alumni Affairs & Intl. Programmes

Prof. S.K. Gupta : Student Affairs

Prof. K.S. Rao : Infrastructure

Associate Deans

Prof. M.R. Ravi : Curriculum

Prof. T.C. Kandpal : PG Research

Prof. Naresh Bhatnagar : Research & Development

Prof. Aditya Mittal : Students Events

Prof. P.M.V. Subba Rao : Hostel Management

Prof. (Ms.) Manju Mohan : Student Welfare

Prof. Neeraj Kumar Jha : Infrastructure

Dr. B.K. Panigrahi : Infrastructure

REGISTRAR

Dr. Sandeep Chatterjee

THE SENATE

V. Ramgopal Rao, Chairman

(Director)

Deputy Directors

Ashok Gupta

M. Balakrishnan

All Professors (or equivalent)

G.P. Agarwal

V.K. Agarwal

Ashwini K. Agarwal

Suhail Ahmad

Babu J. Alappat

R. Algrusamy

S.K. Atreya

Anshul Kumar

R. Bahl

D.K. Bandhopadhyay

S. Banerjee

B.K. Behera

Bijoy H. Boruah

Ananjan Basu

S. Basu

Kanika T. Bhal (Ms.)

A.N. Bhaskarwar

B. Bhattacharjee

T.S. Bhatti

Naresh Bhatnagar

B. Bhowmik (Ms.)

G. Bhuvanewari (Ms.)

Jayashree Bijwe (Ms.)

V.S. Bisaria

Ranjan Bose

Chandra B. (Ms.)

B.R. Chahar

Sudhir Chandra

N. Chatterjee

Ratnamala Chatterjee (Ms.)

R. Chattopadhyay

Santanu Chaudhury

Sujeet Chaudhary

Tapan Kumar Chaudhuri

Anoop Chawla

Apurba Das

Manoj Datta

S. Dharmaraja

Viresh Dutta

S.G. Deshmukh

Anupam Dewan

Chinmoy Sarkar Dey

J.K. Dutt

Anil Jacob Elias

Naveen Garg

A. Ganguli

A.K. Ganguli

Anup K. Ghosh

N.K. Garg

Rahul Garg

James Gomes

A.K. Gosain

V.R. Gunturi

Bhuvanesh Gupta

Deepti Gupta (Ms.)

M.P. Gupta

S.K. Gupta (Ch.E.)

Sayed E. Hasnain

Sriram Hegde

Harish Hirani

S.M. Ishtiaque

K.C. Iyer

A.K. Jain

P.K. Jain

S.K. Jain

Sanjeev Jain

V.K. Jain

Manjeet Jassal (Ms.)

B. Jayaram

Jayadeva

M. Jagadesh Kumar

Mangla Joshi (Ms.)

S.D. Joshi

S.R. Kale

N.C. Kalra

THE SENATE (contd.)

Prem Kumar Kalra
Tara C. Kandpal
Santosh Kapuria
I.N. Kar
Subrat Kar
Ravinder Kaur (Ms.)
S.C. Kaushik
Saroj Kaushik (Ms.)
A.K. Keshari
Rajesh Khanna
Mukesh Khare
S.K. Khare
Neeraj Khare
Rakesh Khosa
Veena Koul (Ms.)
Sangeeta Kohli (Ms.)
S. Kundu
Ajit Kumar
Amit Kumar
Arun Kumar (Phy.)
Arun Kumar (CARE)
S. Arun Kumar (CS&E)
S.K. Koul
N.D. Kurur
Manju Mohan (Ms.)
Alok Madan
Hitendra K. Malik
Ranjan Kumar Mallik
B.R. Mehta

D.S. Mehta
Shashi Mathur
Maithili Sharan
Saroj Mishra (Ms.)
Sukumar Mishra
Prashant Mishra
A.K. Mittal
Aditya Mittal
Sudipto Mukherjee
Ratan Mohan
Atul Narang
K. Narayanan
B.P. Patel
Sanjiva Prasad
R.B. Nair (Ms.)
S.N. Naik
Arvind K. Nema
Sunil Nath
B.S. Panda
Preeti Ranjan Panda
Sunil Pandey
Siddharth Pandey
K.K. Pant
Nalin Pant
B.S. Panwar
Shankar Prakriya
Rajesh Prasad
K.R. Rajagopal
A. Ramanan

N.G. Ramesh
A.D. Rao
K.S. Rao
P.M.V. Subba Rao
P. Venkateswara Rao
S.C.S. Rao
Anurag Singh Rathore
M.R. Ravi
V. Ravishankar
Anjan Ray
G.B. Reddy
R.S. Rengasamy
P.K. Roychoudhury
Shantanu Roy
Subir Kumar Saha
Ambuj D. Sagar
Sanjeev Sanghi
Sanil V.
Huzur Saran
Anil Kumar Saroha
Santosh Satya (Ms.)
Kushal Sen
P. Senthikumaran
Jagdish T. Sahu
Puneet Mahajan
Sandeep Sen
Ravi Shankar (Chy.)
Ravi Shankar (DMS)
Anurag Sharma

THE SENATE (contd.)

R.K. Sharma
Satyawati Sharma (Ms.)
M.R. Shenoy
Bhim Singh
A.K. Singh
Harpal Singh
Jai Deo Singh
Purnima Singh (Ms.)
S.N. Singh
S.P. Singh
R.K. Soni
Sushil
A.K. Srivastava
Pankaj Srivastava
T.R. Sreekrishnan
N. Tandon
G.N. Tiwari
Geetam Tiwari (Ms.)
K. Thyagarajan
Amitabha Tripathi
Suneet Tuli
C.A. Tomy
V. Upadhyay
R.K. Varshney
M. Veerachary
S.V. Veeravalli
V.K. Vijay
S.S. Yadav

Three Educationists from Outside IIT Delhi

O.P. Kharbanda
Chandra Shekhar
Sudhir A. Shah

Head, Central Library

B.D. Gupta

Head, Central Workshop

P.V. Madhusudan Rao

One of the Wardens

Dipti Ranjan Sahoo

Chairman, Grades & Registration (UG&PG)

D. Ravi Kumar

Chairman, Time Table Committee (UG/PG)

G.V. Prakash

Six Members of the Faculty

Mausam
Jayan Jose Thomas
A.K. Darpe
Sunil Kumar
Gopal Krishen
Vivekanandan Perumal

Three Alumni Representatives

Yogesh Kumar Gupta
Sanjeeva Shivesh
Aparna Saroagi (Ms.)

Four Student Representatives

Jyant Nahata (Shivalik)
Vaibhav Anand (Aravali)
Umang Bhambri (Satpura)
Darpagiri Mondal (Girnar)

Registrar

Sandeep Chatterjee
(Secretary)

CHAIRMEN OF THE BOARDS

V. Ramgopal Rao	Board of Educational Research and Planning, Executive Committee of the Senate, Student Affairs Council
Naresh Bhatnagar	Industrial Research and Development Board
Anurag Sharma	Board for Academic Programmes

PRESIDENTS OF BOARDS FOR STUDENT ACTIVITIES

S.K. Khare	Board for Students Publications
Jyoti Kumar	Board of Recreational and Creative Activities
P.M.V. Subbarao Associate Dean (HM) Ex-Officio	Board of Hostel Management
Manju Mohan (Ms.) (Vice Chairman) Associate Dean (SW) Ex-Officio	Student Teacher Interaction Committee
Anil Saroha (President)	Board for Sports Activities
Manju Mohan (Ms.) (President) Associate Dean (SW) Ex-Officio	Board for Students Welfare
Dr. Shashank Bishnoi	Vice President BSW
Dr. Pramit K. Chowdhury	Vice President BSA
Dr. Samrat Mukhopadhyay	Vice President BRCA

LIBRARY

B.D. Gupta	Chairman, ACL
Deputy Librarian Neeraj Kumar Chaurasia	

OTHERS

A.K. Saroha	Advisor, Foreign Students
Rajesh Prasad	Coordinator, NSS
Brejesh Lall	Coordinator, NCC
R.K. Varshney	SC/ST Preparatory Course

CHAIRMEN OF ACADEMIC ACTIVITIES

Huzur Saran Head, CSC (Ex-Officio)	Computer User's Committee
N.D. Kurur	JEE Chairman (Advanced-2016)
B.D. Gupta	Advisory Committee for Library (ACL)
S.K. Khare	Chairman (GATE/JAM-2017)
Manju Mohan (Ms.) President BSW (Ex-Officio)	Head, Counselling Service
S.S. Yadav	Hindi Cell (Head)
D. Ravi Kumar	Grade & Registration (UG & PG)
G.V. Prakash	Time Table Committee (UG & PG)

COORDINATORS OF INTERDISCIPLINARY PROGRAMMES

M.Tech. Programmes

Deepak Kumar	Industrial Tribology & Maintenance Engineering
J. Jacob	Polymer Science & Technology
K.A. Subramanyan	Energy Studies / Energy & Environment Management
N. Chatterjee	Computer Applications
Anshul Kumar	VLSI Design, Tools & Technologies

M.Tech. and Research Programmes

R.K. Varshney	Opto Electronics & Optical Communications
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Research Programme

Geetam Tiwari (Ms.)	Transportation Research and Injury Prevention Programme (TRIPP)
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Others

Mahim Sagar	Quality Improvement Programme/ Continuing Education Programme/OCDC
V.K. Vijay	Unnat Bharat Cell (UBC)

COORDINATORS OF CENTRAL FACILITIES

(Located in Departments/Centres)

N.D. Kurur	NMR
Sujeet Chaudhary	Liquid Nitrogen
Kushal Sen	SEM
Sameer Sapra	Glass Blowing Workshops
G.B. Reddy	TEM
B.R. Mehta	AFM+STM (Atomic Force Microscope+Scanning Tunneling Microscope)
Vikram Kumar	Nanoscience Research Facility

CENTRAL WORKSHOP

Professor and Head	P.V. Madhusudan Rao
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CHAIRMEN OF OTHER COMMITTEES

V. Ramgopal Rao (Director)	Official Language Implementation Committee
Anurag Sharma	Institute Lecture Series Committee
Anurag Sharma	Standing Committee for Convocation 2014
Anurag Sharma	Kendriya Vidyalaya Mangement Committee
Anurag Sharma	Nursery & K.G. School Advisory Committee
K.S. Rao	Commercial Establishments & Licencing Committee
K.S. Rao	Commercial Establishments Monitoring Committee
K.S. Rao	House Allotment Committee
K.S. Rao	Air-conditioning Committee
M.P. Gupta	Committee for House Building and other Advances
G.B. Reddy	Hospital Advisory Committee
T.C. Kandpal	Employees Welfare Committee
M. Balakrishnan	Institute Grievance Committee
S.K. Gupta	Managing Committee for Eating Outlets
S.N. Singh	Security Advisory Committee
S.N. Singh	Managing Committee of the Benevolent Fund Scheme
S.N. Singh	Executive Committee of IITD Staff Welfare Scheme

WARDENS OF HOSTELS

Rajendra Singh Dhaka	Kumaon
Abhijeet Majumdar	Nilgiri
Sudarshan Ghosh	Aravali
Seema Sharma (Ms.)	Kailash
Ravi P. Singh	Jwalamukhi
Dipayan Das	Shivalik
M.C. Ramteke	Karakoram
Dipti Ranjan Sahoo	Vindhyachal
P.M.V. Subbarao	Nalanda / IP / New Vindhyachal
Sreedevi U. (Ms.)	Himadri
Sudip K. Pattanayek	Satpura
Saif K. Mohammed	Zanskar
D. Sundar	Girnar
Smruti R. Sarangi	Udaigiri

PROFESSOR-IN-CHARGE OF DIFFERENT SECTIONS

Prof.-in-Charge (Planning)	: Sudipto Mukhejee
Prof.-in-Charge (Guest Houses/Halls)	: Tapan K. Chaudhari
Prof.-in-Charge (Training & Placement)	: Shashi Mathur
Prof.-in-Charge (EHLS Unit)	: Nalin Pant

HINDI CELL

Head	S.S. Yadav
------	------------

STUDENT COUNSELLING SERVICE

Head	Manju Mohan (Ms.)
------	-------------------

COUNSELLOR

Rupa Murghai
Rama Raj

ADMINISTRATIVE COMPUTERISATION SUPPORT SERVICE

Head	Huzur Saran
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CVC

Chief Vigilance Officer	S.S. Yadav
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RTI

Public Information Officer	K.K. Bhattacharjee
Appellate Authority	Sandeep Chatterjee, Registrar

HOSPITAL SERVICES

Head	Brahm Prakash
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ADMINISTRATION

Sandeep Chatterjee
M.K. Gulati
N.C. Chauhan
K.K. Bhattacharjee
Vivek Raman
Atul Vyas
N. Bhaskar
V.K. Vashistha
Mohd. Shamim
Ramesh Kumar Thareja
Alan V. Sinate
Mukesh Chand
Raj Kumar Gupta
Satish Narayanan Tiwari
Deb Ranjan Mukherjee
Sanjay Pande
Amitabh Mukherjee
G.K. Taneja
K.M. Vijay Kumar
Anuj Gaur
Rafat Jamal
V.K. Bharaj
Hitendra Govil
K.P. Mishra
Prem Kumar
Brahm Prakash
Ashok Kumar
Raju Ram Parihar
Pradip karamarkar
Vishal
Brahm Prakash
Lily Khosa (Ms.)
Renu Misurya (Ms.)
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Anila Khosla (Ms.)
M.K. Sagar
P.K. Rajesh
Md. Ashafaque Hussain
Sayed Yasmeen Raunaq
L. Pangerlemba
Naveen Mishra
Deepak Negi
Anishya Madan (Ms.)
Rajlaxmi Borah
Rama Raj
Shachi Mathur
Sandeep Sharma

Registrar (On contract)
Joint Registrar (Deputation at CBSE)
Joint Registrar (Deputation at TIFAC)
Deputy Registrar (SP Section, CPIO, RTI, R&I)
Deputy Registrar (PGS, Publication Cell)
Deputy Registrar (Director's Office)
Assistant Registrar (Coordination, Health Unit, E-I, Hindi Cell)
Assistant Registrar (R&D)
Assistant Registrar (Institute's Accounts, Addl. charge of D.R. Accounts)
Assistant Registrar (E-II & Manpower Training)
Assistant Registrar (UGS, Nursary and K.G. School, IIT Delhi)
Assistant Registrar (SAS)
Assistant Registrar (Accounts Section)
Assistant Registrar (Legal Cell, Nodal officer for Public Grievances)
Assistant Registrar (Accounts Section)
Assistant Registrar (Plang, Alumni, Conference)
Assistant Registrar (SAS Accounts)
Executive Engineer & Offtg. Institute Engineer
Executive Engineer
Executive Engineer
Assistant Executive Engineer
Assistant Executive Engineer
Assistant Executive Engineer
Assistant Executive Engineer
Assistant Executive Engineer
Assistant Executive Engineer
Assistant Executive Engineer
Assistant Executive Engineer
Assistant Executive Engineer
Assistant Executive Engineer
Assistant Executive Engineer
Assistant Executive Engineer
Assistant Executive Engineer (On deputation)
Head, Hospital Services (On contract)
CMO (SAG)
CMO (SAG)
CMO (SAG)
CMO
CMO (NFSG)
Sr. Medical Officer (Homeopathic)
Sr. Medical Officer
Medical Officer
Medical Officer
Medical Officer (Dental) (On contract)
Sports Officer
Industrial Liaison Officer
Medical Officer (On contract)
Student Counsellor (On contract)
Student Counsellor
Security Officer and Transport Unit

INDIAN INSTITUTE OF TECHNOLOGY DELHI

THE HONOUR CODE

I, Entry No.....
do hereby undertake that as a student at IIT Delhi :


- 1) I will not give or receive aid in examinations; that I will not give or receive unpermitted aid in class work, in preparation of reports, or in any other work that is to be used by the instructor as the basis of grading; and
- 2) I will do my share and take an active part in seeing to it that others as well as myself uphold the spirit and letter of the Honour Code.

 I realise that some examples of misconduct which are regarded as being in violation of the Honour Code include :


 Copying from another's examination paper or allowing another to copy from one's own paper;


 Unpermitted collaboration;


 Plagiarism;

 Revising and resubmitting a marked quiz or examination paper for re-grading without the instructor's knowledge and consent;

 Giving or receiving unpermitted aid on take home examinations;

 Representing as one's own work, the work of another, including information available on the internet;

 Giving or receiving aid on an academic assignment under circumstances in which a reasonable person should have known that such aid was not permitted; and

 Committing a cyber-offence, such as, breaking passwords and accounts, sharing passwords, electronic copying, planting viruses, etc.

I accept that any act of mine that can be considered to be an Honour Code violation will invite disciplinary action.

Date.....

Student's Signature.....

Name.....

Entry No.....



Indian Institute of Technology Delhi

Hauz Khas, New Delhi-110 016 (India)