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 unfeigned spirit of exploration, rationality and enterprise.

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………………………………………
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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”; CNBC-TV18 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.
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.

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<tr>
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<tr>
<td>Department of Electrical Engineering</td>
<td>Instrument Design and Development Centre</td>
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<tr>
<td>Department of Humanities and Social Sciences</td>
<td>Centre for Polymer Science and Engineering</td>
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<tr>
<td>Department of Management Studies</td>
<td>Centre for Rural Development and Technology</td>
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<td>Department of Mathematics</td>
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<td>Department of Physics</td>
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<td>Department of Textile Technology</td>
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<th>Schools</th>
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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

<table>
<thead>
<tr>
<th>Degree</th>
<th>Status</th>
<th>Minimum Eligibility for Admission</th>
<th>Selection basis</th>
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</thead>
</table>
| 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 |
<p>|        | 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 &gt; 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&gt; (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       | Bachelor’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  |</p>
<table>
<thead>
<tr>
<th>Degree</th>
<th>Status</th>
<th>Minimum Eligibility for Admission</th>
<th>Selection basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.S.</td>
<td>Full Time/ Part Time sponsored Full Time/ Part Time</td>
<td>Full Time / Same as the corresponding M.Tech. requirements.</td>
<td>Same as the corresponding M.Tech. requirements.</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>Full Time</td>
<td>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. or equivalent degree are required to have a valid GATE Score (300 or qualifying score whichever is higher for GE/OBC &amp; 200 or qualifying score whichever is higher for SC/ST/PD) or UGC/CSIR/DBT/ICMR/INSPIRE fellowship examination for Sciences/Humanities and 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.</td>
<td>Written test and/or interview</td>
</tr>
<tr>
<td>Part Time</td>
<td>Same as for Ph.D. full time and minimum 2 years experience and No Objection from the employer</td>
<td></td>
<td>Written test and/or interview</td>
</tr>
<tr>
<td>Sponsored Full Time or Part Time</td>
<td>Certificate from employer (as per Note 8.) No GATE required (Note.12)</td>
<td>-Do-</td>
<td></td>
</tr>
<tr>
<td>Part Time Foreign National Posted in Delhi</td>
<td>Same as for full-time Subject to conditions stipulated in Note 13.</td>
<td>-Do-</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

1. 15% seats are reserved for SC candidates, 7.5% for ST candidates and 27% for OBC (non-creamy layer) candidates.

2. 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.

\[
G = 0.75 + \left( \frac{P}{10} \right) \quad \text{or} \quad P = 10 \times (G - 0.75)
\]

where G is the GPA on 10 points scale and P is the % marks.
Using this formula, the conversions work out as follows:-

<table>
<thead>
<tr>
<th>%</th>
<th>CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>5.75</td>
</tr>
<tr>
<td>55</td>
<td>6.25</td>
</tr>
<tr>
<td>60</td>
<td>6.75</td>
</tr>
<tr>
<td>70</td>
<td>7.75</td>
</tr>
<tr>
<td>75</td>
<td>8.25</td>
</tr>
<tr>
<td>80</td>
<td>8.75</td>
</tr>
<tr>
<td>90</td>
<td>9.75</td>
</tr>
</tbody>
</table>

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

\[ G = G_x \times \frac{10}{X} \]

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.

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

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:-

<table>
<thead>
<tr>
<th></th>
<th>1st semester</th>
<th>%</th>
<th>2nd semester</th>
<th>%</th>
</tr>
</thead>
</table>
| 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

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

#### Semester fee (to be paid every semester along with Tuition fee)

<table>
<thead>
<tr>
<th>INSTITUTE FEES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination fees</td>
<td>₹ 500</td>
</tr>
<tr>
<td>Registration/Enrolment fees</td>
<td>₹ 300</td>
</tr>
<tr>
<td>Gymkhana</td>
<td>₹ 500</td>
</tr>
<tr>
<td>Medical fees</td>
<td>₹ 100</td>
</tr>
<tr>
<td>Internet and computer access fee</td>
<td>₹ 500</td>
</tr>
<tr>
<td>Transport charges</td>
<td>₹ 100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>₹ 2,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HOSTEL FEES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hostel seat rent</td>
<td>₹ 5,000</td>
</tr>
<tr>
<td>Amenity charges</td>
<td>₹ 300</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>₹ 5,300</td>
</tr>
</tbody>
</table>
OTHER PAYMENTS

<table>
<thead>
<tr>
<th>Student Distress Fund Scheme</th>
<th>₹ 200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insurance Scheme</td>
<td>₹ 500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>₹ 700</td>
</tr>
</tbody>
</table>

One Time payment to be paid at the time of admission

<table>
<thead>
<tr>
<th>Non Refundable</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission fees</td>
<td>₹ 1,000</td>
</tr>
<tr>
<td>Student welfare fund</td>
<td>₹ 300</td>
</tr>
<tr>
<td>Modernization fees</td>
<td>₹ 500</td>
</tr>
<tr>
<td>Benevolent fund</td>
<td>₹ 200</td>
</tr>
<tr>
<td>Alumni fees</td>
<td>₹ 1,000</td>
</tr>
<tr>
<td>Training and Placement charges</td>
<td>₹ 500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>₹ 3,500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Refundable</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Institution security deposit</td>
<td>₹ 2,000</td>
</tr>
<tr>
<td>Library security deposit</td>
<td>₹ 2,000</td>
</tr>
<tr>
<td><strong>Total fees payable at the time of admission</strong></td>
<td>₹ 4,000</td>
</tr>
</tbody>
</table>

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 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, Vindyachal, 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 Araval 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 Origamy, 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.

Debating Club

The Debating 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 Pouri, Cryptic Crosswords are planned. A trip to the famous Jaipur Literary Fest and other trips organized by the Literary Club have been the most memorable literary adventures the club has seen.

Literary 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 Pouri, Cryptic Crosswords are planned. A trip to the famous Jaipur Literary Fest and other trips organized by the Literary Club have been the most memorable literary adventures the club has seen.

Hindi Samiti

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.

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.
Music 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.

Photography and Films Club

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 organizes 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, qawwals 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.

Drama Club

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 Board’s 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. Students are encouraged to keep in constant touch with his/her advisor 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. Students’ 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 : smohan@cat.ernet.in  
Jaipur :  President : Mr. Sudhir Bansal; Mob: 9829019770; E-mail : sudhir@dil.in  
           Secretary : Mr. Chintan Bakshi; E-mail : chintan@startuposis.in  
           Treasurer : Mr. Yogesh Soni; Mob: 9352556138; E-mail : sonisonyogesh@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
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.
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.

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.

Murali R. Cholemari, Ph.D (IISc., Bangalore)
Assistant Professor

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

Sriram Hegde, Ph.D. (IIT Delhi)
Senior Systems Programmer/Manager
System Programming, Finite Element Analysis, FE Mesh Generation, CAD and CAM, Heat Transfer.

Jayant Jain, Ph.D. (Univ. British Columbia)
Assistant Professor
Mechanical behavior materials, texture anisotropy, Microstructure property correlation, alloy design, phase transformation

Santosh Kapuria, Ph.D. (IIT Delhi)
Professor
Smart Composite and Sandwich Structure, Structures Health Monitoring, Active Vibration Control, Functionally grade and Structures, Elasticity.

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

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.

B.P. Patel, Ph.D. (MNNIT, Allahabad)
Professor
Pradyumna S., Ph.D. (IIT Kharagpur)  
**Assistant Professor**  
Functionally Graded Materials, Structural Dynamics, Stability, Composite Structures, Smart Structures, Plates and Shells.

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

Anamika Prasad, Ph.D. (MIT)  
**Assistant Professor**  
Cardio-vascular bio-mechanics, nano-indentation Finite Element Methods  
Nanomechanics, Numerical Analysis.

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.

Rajesh Prasad, Ph.D. (Cambridge Univ.)  
**Professor**  
Physical metallurgy, metal foams, nanocomposites, friction stir welding.

Sawan Suman, Ph.D. (Texas A & M)  
**Assistant Professor**  
Turbulence Theory and Modeling, Hypersonic flows, Bridging method of turbulence, Boltzmann equation-based solvers.

Sitikantha Roy, Ph.D. (Utah State Univ.)  
**Assistant Professor**  
Soft materials, mechanobiology, structural mechanics.

Balaji Srinivasan, Ph.D. (Stanford)  
**Associate Professor**  

Sanjeev Sanghi, Ph.D. (City Univ.)  
**Professor**  
Numerical and Analytical Studies of Turbulent Flows, Chaos and Dynamical Systems, Computational Fluid Dynamics, Educational Software.

Vikrant Tiwari, Ph.D. (South Carolina Univ.)  
**Assistant Professor**  

Arjun Sharma, Ph.D. (Stanford)  
**Assistant Professor**  
Compressible flows, acoustics and numerical simulations.

S.V. Veeravalli, Ph.D. (Cornell Univ.)  
**Professor**  
Arghya Samanta, Ph.D. (UPMC, France)
Visiting Faculty
Fluid Mechanics.

Adjunct Faculty
Naval Architecture, Structural Design of Warships, Materials for Marine Vehicles.

Lt. Cdr. K. Vignesh Kumar, M.Tech. (IIT Kharagpur)
Adjunct Faculty

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

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

Adjunct Faculty
Naval Architecture, Warship Design, Ocean Engineering.

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


• 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.


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:**

**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 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, 10 T 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  

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.

Misra Ashish, Ph.D. (Rutgers The State University of New Jersey, New Brunswick)  
Assistant Professor  
Metabolic Analysis and Engineering; Clinical Diagnostics; Bioprocessing.

Shaikh Ziauddin Ahammad, Ph.D. (IIT Delhi)  
Assistant Professor  
Wastewater Treatment -Physico-chemical and Biological, Anaerobic Wastewater Treatment.

V.S. Bisaria, Ph.D. (IIT Delhi)  
Professor  
Bioprocess technology; Metabolic regulation and engineering; Bioconversions; Plant cell biotechnology.

Ravikrishnan Elangovan, Ph.D. (Florence Univ.)  
Assistant Professor  
Single Molecule Biophysics, Fluorescence Spectroscopy, Molecular Motors, Skeletal Muscle Mechanics.

Ritu Kulshreshtha, Ph.D. (Delhi Univ.)  
Assistant Professor  
RNAi Technology, MicroRNAs in Cancer Biology, Cancer/Disease Biomarkers, Hypoxia Research.

Saroj Mishra, Ph.D. (New York City Univ.)  
Professor  
Molecular Enzymology and Applications of Hydrolytic Enzymes, Yeast Expression Systems, Enzyme Mediated Bioremediation.

Misra Ashish, Ph.D. (Rutgers The State University of New Jersey, New Brunswick)  
Assistant Professor  
Metabolic Analysis and Engineering; Clinical Diagnostics; Bioprocessing.

Atul Narang, Ph.D. (Purdue Univ.)  
Professor  
Systems Biology of Microbial Gene Regulation.

Sunil Nath, Dr. Ing. (Braunschweig Univ.)  
Professor  
Bioseparation, Mechanism and Thermodynamics of ATP-based Molecular Machines, Molecular Systems Biology/Engineering

P.K. Roychoudhury, Ph.D. (IIT Delhi)  
Professor  
Bioprocess Engineering, Cell Culture Engineering.
**Shilpi Sharma, Ph.D. (I.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 focusing 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 microcomputer 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.
BIOCHEMICAL ENGINEERING & BIOTECHNOLOGY
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

Suddhasatwa 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

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 Pattern 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
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 the 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 furbished 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.
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, NOx reduction technologies such as lean NOx traps and selective catalytic reduction.

**Fluid and Particle Mechanics:** Characterization of particles, comminution 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 aphrons and reverse micellar extraction, de-bittering of fruit juices for improved shelf life and taste.


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

Professor

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

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

Professor

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

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

Associate Professor

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

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.

Tanmay Dutta, Ph.D. (Calcutta University)

Assistant Professor

Biochemistry, Enzymology, Molecular RNA Biology, Genetics.

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

Professor

Synthetic Main Group and Organometallic Chemistry.

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

Professor

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

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.

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

Associate Professor

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

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

Assistant Professor

Electrochemical techniques, Electroanalysis, Nanomaterials.

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

Associate Professor

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

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

Nalin Pant, Ph.D. (Princeton Univ.)
Professor
Theoretical and Experimental Studies on Molecular Conformation, Molecular Recognition.

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

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
Organochalogen 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.

• **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.


LABORATORY FACILITIES

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

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

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

Gurmail S. Benipal, Ph.D. (IIT Delhi)
Associate Professor
Structural Engineering, Nonlinear Dynamics and Stability, Constitutive Modelling, Concrete Mechanics: Creep, Elastoplasticity, Damage, Cable Dynamics.

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

B. Bhattacharjee, Ph.D. (IIT Delhi)
Professor
Durability of Concrete, Rebar Corrosion, Cement based Composites, Construction Technology, Building Science, Green Building, Sustainability.

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.

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

Sumedha Chakma, Ph.D. (IIT Delhi)
Assistant Professor

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

S.K. Deb, Ph.D. (IIT Delhi)
Associate Professor
Transportation Engineering, Urban Engineering, Fuzzy System Modelling, Airways, Academic Programmes.
Abhijit Ganguli, Ph.D. (ULB, Belgium)
Assistant Professor

K.C. Iyer, Ph.D. (IIT Madras)
Professor
Construction Engineering and Management, Contracts and Arbitration, Structural Engineering, VDC and Building Information Model, Project Risk.

N.K. Garg, Ph.D. (Wales Univ.)
Professor
Water Resources System, Finite Element, Watershed Modelling, Irrigation Management, CAD.

A.K. Jain, Ph.D. (IIT Delhi)
Professor
Design of RCC and Steel Structures, Earthquake Engineering, Wind Engineering, Offshore Structures, Dynamic Testing of Structures.

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

K.N. Jha, Ph.D. (IIT Delhi)
Associate Professor

D.R. Kaushal, Ph.D. (IIT Delhi)
Associate Professor

Ashok Gupta, Ph.D. (IIT Delhi)
Professor
Structural Engineering, Earthquake Engineering, Health Monitoring of Structures.

A.K. Keshari, Ph.D. (IIT Kanpur)
Professor
Groundwater Flow and Pollution Modelling, Remote Sensing and GIS, Hydrology, Optimization and FEM, EIA and Hydrogeological Hazard.

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.

Dhanya C.T. Ph.D. (IISc, Bangalore)
Assistant Professor
<table>
<thead>
<tr>
<th>Name</th>
<th>Degree</th>
<th>Institution</th>
<th>Position</th>
<th>Research Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mukesh Khare, Ph.D.</td>
<td></td>
<td>(New Castle Univ.)</td>
<td>Professor</td>
<td>Air and Vehicular Pollution Modelling, Indoor Air Pollution, Urban Air Quality Management.</td>
</tr>
<tr>
<td>Arun Kumar, Ph.D.</td>
<td></td>
<td>(Drexel Univ.)</td>
<td>Assistant Professor</td>
<td>Human Health Risk Assessment, Nanoparticles, Water Treatment, Decision-making, Emerging Contaminants.</td>
</tr>
<tr>
<td>Alok Madan, Ph.D.</td>
<td></td>
<td>(Univ. at SUNY/Buffalo)</td>
<td>Professor</td>
<td>Earthquake Engineering, Nonlinear Structural Dynamics, Concrete Structures, Computing in Structural Engineering, Structural Masonry.</td>
</tr>
<tr>
<td>B. Manna, Ph.D.</td>
<td></td>
<td>(IIT Kharagpur)</td>
<td>Assistant Professor</td>
<td>Foundations for Industrial Machines, Dynamic Soil-Pile Interaction, Soil Dynamics, Foundation Engineering, Geotechnical Earthquake Engineering.</td>
</tr>
<tr>
<td>Shashi Mathur, Ph.D.</td>
<td></td>
<td>(Delaware Univ.)</td>
<td>Professor</td>
<td>Groundwater Contamination Bioremediation of Soils, Flow through Porous Media, Phyto-remediation, Biodegradation in Landfills.</td>
</tr>
<tr>
<td>M.M. Rao, Ph.D.</td>
<td></td>
<td>(IIT Delhi)</td>
<td>Senior Programmer</td>
<td>ANN Control of Building Frames, MIS, System Administration, Development of Application Software.</td>
</tr>
</tbody>
</table>
Kalaga R. Rao, Ph.D. (IIT Kharagpur)
Associate Professor
Mass Transit Planning, Traffic Flow Modelling and Travel Demand Modelling, Road Safety.

K.S. Rao, Ph.D. (IIT Delhi)
Professor

Dipti Ranjan Sahoo, Ph.D. (IIT Kanpur)
Assistant Professor
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

Geetam Tewari, Ph.D. (Univ. of Illinois)
Professor

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:


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


**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.

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.


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.


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

Head of the Department

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Structural properties of Networks, Algorithms, Data Structures

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Professor

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Professor
CAD for VLSI, Computer Architecture.

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

Subhashis Banerjee, Ph.D. (IISc., Bangalore)
Professor

Ragesh Jaiswal, Ph.D. (Univ. of California, San Diego)
Assistant Professor
Algorithms, Complexity Analysis.

Sorav Bansal, Ph.D. (Stanford Univ.)
Assistant Professor
Operating System, Compilers.

Prem Kalra, Ph.D. (EPFL, Switzerland)
Professor
Computer Graphics, 3D Animation.

Naveen Garg, Ph.D. (IIT Delhi)
Professor
Algorithms, Optimization.

Amit Kumar, Ph.D. (Cornell Univ.)
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Algorithms, Computer Networks.
Anshul Kumar, Ph.D. (IIT Delhi)
Professor
CAD for VLSI, Computer Architecture.

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

Subodh Kumar, Ph.D. (Univ. of North California)
Associate Professor
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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Programming Languages, Concurrent Systems.

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Computer Networks.

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Database and Information Retrieval Techniques for Semantic Web Data Management, Information Extraction and Opinion Mining.

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Aaditeshwar Seth, Ph.D. (Waterloo Univ.)
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Sandeep Sen, Ph.D. (Duke University)
Professor
Computational Geometry, Algorithms.

Parag Singla, Ph.D. (Washington Seattle Univ.)
Assistant Professor
Machine Learning, Social Network Analysis, Artificial Intelligence.

Subodh Sharma, Ph.D. (University of Utah)
Assistant Professor
High Performance Computing, Concurrency, Formal Verification.

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

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

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

K.K. Biswas, Ph.D. (IIT Delhi)
Emeritus Faculty
Computer Vision, AI.

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

B.N. Jain, Ph.D. (State University of New York)
Visiting Professor

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

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

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)
Head of the Department

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.

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

Sumeet Agarwal, D.Phil. (Oxford Univ., U.K.)
Assistant Professor
Pattern Recognition, Complex Networks, Systems Biology.

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

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

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Professor (Dhananjay Chair)
Computer Vision, Multimedia Systems, Computational Intelligence.
Anandarup Das, Ph.D. (IISc., Bangalore)
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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

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.

S.D. Joshi, Ph.D. (IIT Delhi)
Professor
Statistical Signal Processing, Image Processing, Multiresolution Signal/Image Analysis

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

V.K. Jain, Ph.D. (IIT Delhi)
Professor
Digital Communication, Optical Communication & Networks.

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

Abhisek Dixit, Ph.D. (Ghent University)
Assistant Professor
Optical Networks, Fibre-Wireless Converged Networks.

S. Janardhanan, Ph.D. (IIT Bombay)
Assistant Professor
Discrete-time Systems, Sliding Mode Control, Robust Control.

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

Tapan Kumar Gandhi, Ph.D. (IIT Delhi)
Assistant Professor
Computational Neuroscience, Neuro-Inspired Engineering, Biomedical Signal and Image Processing, Machine Learning, Assistive Technology.

Jayadeva, Ph.D. (IIT Delhi)
Professor
Machine Learning, Neuromorphic Engineering, VLSI Design, Optimization, Data Analysis, Bioinformatics.
S. Kar, Ph.D. (IISc., Bangalore)
Professor, (Ram and Sita Sabnani Chair)

Uday K. Khankhoje, Ph.D. (California Institute of Technology)
Assistant Professor
Computational Electromagnetics, Remote Sensing, Computational Microwave Imaging.

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

Brejesh Lall, Ph.D. (IIT Delhi)
Associate Professor

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

R.K. Mallik, Ph.D. (Univ. of Southern California)
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Communication Theory & Systems, Difference Equations, Linear Algebra.

S. Mishra, Ph.D. (Sambalpur Univ.)
Professor, (Power Grid Chair)

Bhaskar Mitra, Ph.D. (University of Michigan)
Assistant Professor
All aspects of Design and Fabrication of MEMS, Systems and Sensors.

Saif Khan Mohammed, Ph.D. (IISc., Bangalore)
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Mashuq-un-Nabi, Ph.D. (IIT Bombay)
Associate Professor

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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

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

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

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

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

M. Hanmandlu, Ph.D. (IIT Delhi)
Emeritus Professor

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

J. Nanda, Ph.D. (Moscow Univ.)
Emeritus Fellows/INSA Honorary Scientist

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 undergraduate programmes and nine postgraduate 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 foci 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**

**Computer Technology Group**

**Control Engineering Group**

**Integrated Electronics & Circuits Group**
Power Engineering Group

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

Ankush Agrawal, Ph.D. (IGIDR, Mumbai)  
Assistant Professor  
Development Economics, Applied Econometrics.

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.

Bijoy H. Boruah, Ph.D. (Guelph Univ.)  
Professor  
Philosophical Aesthetics, Philosophy of Mind, Ethics and Value Theory.

Arudra Burra, Ph.D. (Princeton University, USA)  
Associate Professor  
Moral, political, and legal philosophy.

Pritha Chandra, Ph.D. (Univ. of Maryland)  
Associate Professor  
Linguistics, Theoretical Syntax, Language Acquisition (1/2nd), Politics of Language.

Head of the Department

Divya Dwivedi, Ph.D. (IIT Delhi)  
Assistant Professor  
Philosophy of Literature, Aesthetics, Narrative Theory, Literary Theory, Gandhi Studies, Political Cartooning.

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

Samar Husain, Ph.D. (IIT Hyderabad)  
Assistant Professor  
Human Science Processing, National Language Parsing, Natural Language Modeling, Dependency Grammars.

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.

Stuti Khanna, D. Phil. (Oxford Univ.)  
Assistant Professor  
Modernism, Postcolonialism Twentieth-Century Literature, Indian Writing in English, Cities and Gender.
Reetika Khera, Ph.D. (Delhi School of Economics)
Associate Professor

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

Bharati Puri, Ph.D. (Jawaharlal Nehru Univ.)
Assistant 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.

Rajakrishnan 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

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

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  

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

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. (IGIDR, 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


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

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

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

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

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.

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

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

Arpan Kumar Kar, (Fellow, XLRI)
Assistant Professor
E-Commerce, M-Commerce, Social Media, Business Analytics and Intelligence, Digital Marketing and Software Project Management.

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

Jitendra Kumar Madaan, Ph.D. (IIT Delhi)
Assistant Professor
Mahim Sagar, Ph.D. (IIITM, Gwalior)
Associate Professor

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

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

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

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

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

Jaijit Bhattacharya, Ph.D. (IIT Delhi)
Adjunct Faculty

Surya Prakash Singh, Ph.D. (IIITM, Gwalior; PDF, NUS Singapore-MIT USA Alliance)
Associate Professor

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 Entrepreneurship 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,
IIIPA, 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 (GoI), 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
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 technomanagerial 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 contributes 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.
\[
\frac{A_0}{2} + \sum_{n=1}^{\infty} A_n \cos kx \cos \omega t
\]

Department of Mathematics

Limits at

Continuing

\( f(x) \), discontinuity

\( A_n = \frac{2}{\pi} \int_{0}^{\pi} f(x) \cos(nx) dx \)

\( a_n = \frac{1}{\pi} \int_{0}^{\pi} f(x) \cos nx dx \)

\( \lim_{n \to \infty} a_n = A_n \)

\( f(x) \) at \( x = 0 \)

3 - 0
S. Dharmaraja, Ph.D. (IIT Madras)
Professor

Head of the Department

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

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

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

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

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

Aparna Mehra, Ph.D. (Delhi Univ.)
Associate Professor

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

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

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

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

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

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

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

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.


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.
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.

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 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.

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

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

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

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

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

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

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
Microfluidics, 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.
T.K. Kundra, Ph.D. (IIT Delhi)
Guest Faculty
Mechanical system design, Concurrent engineering, Vibration design, CAD/CAM, Finite element model updating.

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.

P.M.V. Subbarao, Ph.D. (IIT Kanpur)
Professor
Experimental turbulence, Tomography, Power generation systems and IC engines.

Sivathanu A. Pillai, Ph.D.
Honorary Professor
Defence and space technologies, Innovation, Creativity and leadership

Kiran Seth, Ph.D. (Columbia Univ.)
Emeritus Professor
Padma Shri
Operations research, Applied probability models, Fuzzy models.

Prem Vrat, Ph.D. (IIT Delhi)
Honorary Professor
Industrial engineering and operations management, Quality management, Value engineering, Scheduling, Maintenance and supply chain management.

A.D. Gupta, M.Tech. (IIT Delhi)
Visiting Faculty
Industrial engineering, Operations research, Value engineering, Industrial quality control.
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 theses 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.


**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.
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.

Sujin B. Babu, Ph.D. (Univ. du Maine, France)
Assistant Professor
Aggregation of Colloids, Porous Media, Low
Reynolds Number Swimmers.

Varsha Banerjee, Ph.D. (IISc., Bangalore)
Associate Professor
Statistical Mechanics of Complex Spin System,
Surface Growth Phenomena, Fractal Architectures
and their Characterization.

Saswata Bhattacharya, Ph.D. (IACS, Kolkata)
Assistant Professor
Computational Materials Science, Energy
Conservation, Catalysis, Graphene, Genetic
Algorithm, Machine learning.

Mukesh Chander, Ph.D. (IIT Delhi)
Associate Professor
Electronics, Solid State Gas Sensors, Surface
Characterization, Nanostructure Materials.

R. Chatterjee, Ph.D. (IIT Kanpur)
Professor
Experimental Condensed Matter Physics - Novel
Magnetic Multi-functional Materials: Bulk and
Nano/Thin Film forms

Sujeet Chaudhary, Ph.D. (IIT Delhi)
Professor
Experimental Condensed Matter Physics: Thin
Films, Nano-Magnetism, Spintronics.

Pintu Das, Ph.D. (University of Saaraland, 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.

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.

Joyee Ghosh, Ph.D. (Jawaharlal Nehru Univ.)
Assistant Professor
Quantum and Nonlinear Optics, Quantum
Information Technologies; Atomic, Molecular and
Optical Physics.

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

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

Ajit Kumar, Ph.D. (Moscow Univ.)
Professor

B.D. Gupta, Ph.D. (IIT Delhi)
Professor

Joby Joseph, Ph.D. (IIT Delhi)
Professor

Ajit Kumar, Ph.D. (Moscow Univ.)
Professor

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
Altafast 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

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

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

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
Rajendra Singh, Ph.D. (Jawaharlal Nehru Univ.)
Associate Professor

J.P. Singh, Ph.D. (Jawaharlal Nehru Univ.)
Associate Professor

Aloka Sinha, Ph.D. (IIT Madras)
Associate Professor
Nonlinear Optics, Liquid Crystals, Optical Information Processing, Biometrics.

R.K. Soni, Ph.D. (IIT Delhi)
Professor

Pankaj Srivastava, Ph.D. (Rajasthan Univ.)
Professor

K. Thyagarajan, Ph.D. (IIT Delhi)
Professor

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
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

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:


**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: Nanomagnetics, 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, Magnetics & Advance

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.
B.K. Behera, Ph.D. (IIT Delhi)
Professor

Ashwini K. Agrawal, Ph.D. (Univ of Rochester)
Professor

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.

S. Wazed Ali, Ph.D. (IIT Delhi)
Assistant Professor

B.S. Butola, Ph.D. (IIT Delhi)
Associate Professor
Textile Chemical Processing, Polymeric Nano Composites, Enzymatic Processing of Textiles, Ballistic Textiles.

R. Chattopadhyay, Ph.D. (IIT Delhi)
Professor
Yarn manufacturing processes, Quality assurance, Ropes and cordages, Product development.

Head of the Department
Ashwini K. Agrawal, Ph.D. (Univ of Rochester)
Professor

Apurba Das, Ph.D. (IIT Delhi)
Professor
Clothing Comfort, Nonwoven & Technical Textiles, Compression Bandage, Protective Clothing, Yarn Manufacturing, Instrumentation.

Dipayan Das, Ph.D. (Tech. Univ. of Liberec)
Associate Professor

Saurabh Ghosh, Ph.D. (Basel Univ., Switzerland)
Associate Professor
Tissue Engineering, Medical Textile, Polymeric Nanomaterials.

Bhuvanesh Gupta, Ph.D. (IIT Delhi)
Professor

Deepti Gupta, Ph.D. (IIT Delhi)
Professor
Surface Functionalization, Functional Clothing, Garment fit and sizing.
S.M. Ishtiaque, (Tech. Univ. of Liberec)
Professor

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

Abhijit Majumdar, Ph.D. (Jadavpur Univ.)
Associate Professor

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

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.
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.

S.K. Koul, Ph.D. (IIT Delhi)
Professor
Microwave and Millimeter Wave Engineering, Antennas and RF MEMS.

Monika Aggarwal, Ph.D. (IIT Delhi)
Associate Professor
Signal Processing, Communication, Sensor Array Processing and Underwater Acoustics.

Saakshi Dhanekar, Ph.D. (Jamia Millia Islamia)
INSPIRE Faculty
Nano-sensors, Microfluidics, Porous Silicon fabrication and applications for chemical and bio-detection.

Prabhu Babu, Ph.D. (UU, Sweden)
Assistant Professor
Signal Processing and Communications, Machine Learning and Optimization.

Suneet Tuli, Ph.D. (IIT Delhi)
Professor
Nondestructive Characterization, Thermography & Thermal Imaging System.

R. Bahl, Ph.D. (IIT Delhi)
Professor

Vikram Kumar, Ph.D. (Lehigh Univ.)
Emeritus Professor
Semiconductor Physics and Technology, Nanotechnology.

Ananjan Basu, Ph.D. (Univ. of California)
Professor
Microwave and Millimeter-wave Engineering.

Ulrich L. Rohde, Ph.D. (Clayton University, USA)
Honorary Professor
Microwave circuits, (Amplifiers, Oscillators and Mixers) as well as Frequency Synthesizers.

Sudhir Chandra, Ph.D. (IIT Delhi)
Professor
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 finance, 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 Acoustic Chamber and Speech Processing research studies, Kerr Effect Measurements, 48 node computational cluster, Magnetorelaxometry.
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.

Vimlesh Pant, Ph.D. (Indian Inst. of Tropical Metrology, Pune)
Assistant Professor
Physical Oceanography, Ocean Modelling, Atmospheric Aerosols, Meteorological and Oceanographic Observations.

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.

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.

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.

Somnath Baidya Roy, Ph.D. (Rutgers, USA)
Associate Professor
Land - atmospheric Interaction, Renewable Energy, Wind energy, Boundary layer processes.

Saroj K. Mishra, Ph.D. (IISc., Bangalore)
Assistant Professor

Maithili Sharan, Ph.D. (IIT Delhi)
Professor
Air Pollution Modelling, Atmospheric Boundary Layer, Computational and Mathematical Methods, physiological fluid dynamics.

Manju Mohan, Ph.D. (IIT Delhi)
Professor

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


**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.


**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.
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; microuidic 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.

Assistant Professor
Quantitative medical image analysis for CT and MRI, Perfusion and Diffusion 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, Microuidics, 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 uids; Modulated DC Iontophoretic Device; electroculeanogram 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 aminoacylase on functionalized acrylics for production of 6- aminopencillinic acid from pencillin; 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.
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

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.

Raj Kumar Chauhan, M.C.A. (MITS, Gwalior)
Senior Programmer
Networking & Systems Administration.

P.K. Gupta, M.Tech. (IETE)
Senior System Programmer

S.R. Hegde, Ph.D. (IIT Delhi)
Senior System Programmer (SG)
CAD/CAM/CAE Service.

Pragya Jain, Ph.D. (IIT Delhi)
Senior System Programmer
Parallel Processing, Cloud Computing & Virtualization, Systems Administration, Numerical Analysis.

Jaya, M.Tech. (IIT Delhi)
Senior Programmer
System Administration, Application Software, Object Oriented Programming, Programming Languages, DBMS.

Sunil Kak, M.Tech. (IETE)
Senior System Programmer
System Administration, Management of Linux & Windows Services and Network Management.

N.C. Kalra, M.Tech. (IIT Delhi)
Manager (SG)
Networking, Internet Computing, Microprocessor Based System Design, System Programming.

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)

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)

R. Raghavan, M.Sc. (IIT Delhi)
Senior System Programmer
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 E5-2670 (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 *RRD Health Graphs* 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
**Head of the Centre**

Sanjeev Sanghi, Ph.D. (City Univ.)  
Professor  
Department of Applied Mechanics.

Shouribrata Chatterjee, Ph.D. (Columbia University)  
Associate Professor  
Department of Electrical Engineering.

Amit Gupta, Ph.D. (UCF)  
Assistant Professor  
Department of Mechanical Engineering.

Ashok Gupta, Ph.D. (IIT Delhi)  
Professor  
Department of Civil Engineering.

Shalini Gupta, Ph.D. (North Carolina State University, USA)  
Assistant Professor  
Department of Chemical Engineering.

Prem K. Kalra, Ph.D. (EPFL, Switzerland)  
Professor  
Department of Computer Science & Engineering.

Kolin Paul, Ph.D. (BESU)  
Associate Professor  
Department of Computer Science & Engineering.

Kushal Sen, Ph.D. (IIT Delhi)  
Professor  
Department of Textile Technology.

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 Abada 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, tablets PCs for projection of the written lectures on the screens, document visualizers and microphone and speakers in the class rooms.
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.

A. Ganguli, Ph.D. (IISc., Bangalore)
Professor
Plasma Physics, Plasma Sources.

Ramesh Narayanan, Ph.D. (Jadavpur Univ.)
Assistant Professor
Plasma Physics and Fusion.

Tara C. Kandpal, Ph.D. (IIT Delhi)
Professor
Solar Energy Utilization,

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.

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

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.
**M.G. Dastidar, Ph.D. (IIT Delhi)**  
Emeritus Professor  

**L.M. Das, Ph.D. (IIT Delhi)**  
Emeritus Professor  

**M.G. Dastidar, Ph.D. (IIT Delhi)**  
Emeritus Professor  

**Ashu Verma, Ph.D. (IIT Delhi)**  
Assistant Professor  

**Sandeep Pathak, Ph.D. (University of Cambridge, U.K.)**  
Assistant Professor  
Hybrid Photovoltaic Devices.

**D.K. Sharma, Ph.D. (Delhi Univ.)**  
Emeritus Professor  
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:


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:


LABORATORY FACILITIES

Excellent facilities are available in the centre for different uses of the industry and for educational and training programmes.

Renewable Energy


Environment Pollution


Electrical Energy Systems


I.C. Engines

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
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.

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

Chief Design Engineers (S.G.)

Gufran Sayeed Khan, Ph.D. (Friedrich-Alexander-University)
Assistant Professor

Jyoti Kumar, Ph.D. (IIT Guwahati)
Assistant Professor

Sumer Singh, M.Des. (IIT Delhi)
Assistant Professor

A.L. Vyas, Ph.D. (IIT Delhi)
Emeritus Professor
Electronic Instrumentation, Smart Sensors, Sensor Networking, Body Area Sensor Networks and Signal Processing.

D.T. Shahani, Ph.D. (IIT Delhi)
Emeritus Professor
Electronic Instrumentation, Electro-magnetics, Antennas.

Chandra Shakher, Ph.D. (IIT Madras)
Emeritus Professor
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:


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.

Josemon Jacob, Ph.D. (Iowa State Univ.)
Associate Professor
Polymer Synthesis, Semiconducting Polymers, Polymer based LEDs and Photovoltaics, Block Copolymers Biodegradable Polymers, Polymerization Catalysis.

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.

Sampa Saha, Ph.D. (Michigan State Univ.)
Assistant Professor

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.

Veena Choudhary, Ph.D. (IIT Delhi)
Emeritus Professor

S.N. Maiti, Ph.D. (Calcutta Univ.)
Emeritus Professor
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 biocompatible 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

Vijay V.K., Ph.D. (IIT Delhi)
Professor

Malik Anushree, Ph.D. (IIT Delhi)
Associate Professor
Food & Environmental Microbiology, Bioremediation, Biopesticides, Anti-microbial agents, Housefly control, Algal biofuels, Phycoremediation.

S.N. Naik, Ph.D. (IIT Delhi)
Professor
Oils, Fats and Waxes Technologies, Super Critical Fluid Extraction of Natural Products, Biofuels, Minor Forest product.

Hariprasad P., Ph.D. (Univ. of Mysore)
Assistant Professor
Environmental Microbiology and Biotechnology, Microbial Biopesticide and Biofertilizer, Bioethanol, Mycotoxins.

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.

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.

Rajendra Prasad, Ph.D. (IIT Delhi)
Emeritus Professor
Rural Energy Systems, Improved Cookstoves, Rural Industrialization, Leather, Pottery, Carpet Making, Food Processing, Milk Processing.

Head of the Centre

Chariar V.M., Ph.D. (IIT Delhi)
Associate Professor
Design for Sustainability, Traditional Knowledge Systems, Appropriate Housing and Ecological Sanitation, Wisdom-based Leadership.

T.R. Sreekrishnan, Ph.D. (IIT Delhi)
Biochemical Engineering and Biotechnology

S.K. Khare, Ph.D. (IIT Delhi)
Chemistry

K.K. Pant, Ph.D. (IIT Kanpur)
Chemical Engineering

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
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.


**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.
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

Kamlesh Singh, Ph.D. (Univ. of Rajasthan)
Humanities & Social Sciences

Kushal K. Shah, Ph.D. (IIT Madras)
Electrical Engineering

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.
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, CFMS-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.
SCHOOL FACULTY

M. Balakrishnan, Ph.D. (IIT Delhi)
Professor

Sorav Bansal, Ph.D. (Stanford Univ.)
Assistant Professor
Operating System, Compilers, Virtualization. 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

Vinay Ribeiro, Ph.D. (Rice Univ.)
Associate Professor
Computer Networks. 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

Anoop Chawla, Ph.D. (IIT Kanpur)
CAD, CAE, Dynamics, Biomechanics, AI & Expert Systems for Design and Manufacturing. Department of Mechanical Engineering

Anshul Kumar, Ph.D. (IIT Delhi)
CAD of VLSI, Computer Architecture. Department of Computer Science & Engineering

B. Chandra, (Ms.), Ph.D. (Delhi Univ.)
Distributed Databases, Neural Networks for NLP, Adaptive Control Models. Department of Mathematics

Bijendra N. Jain, Ph.D. (Stony Brook Univ.)
Computer Networks. BITS Pilani and Dept. of Computer Science & Engineering

Huzur Saran, Ph.D. (Univ. of California Berkeley)
Wireless Networks, Network Performance Analysis, Algorithms. Department of Computer Science & Engineering

K.K. Biswas, Ph.D. (IIT Delhi)
Emeritus Faculty
Computer Vision, AI. Department of Computer Science & Engineering

Kolin Paul, Ph.D. (BESU)
Embedded Systems, Reconfigurable Computing. Department of Computer Science & Engineering

Mausam, Ph.D. (Washington, Seattle), Artificial Intelligence, NLP, automated planning, AI & crowdsourcing. Department 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)**  
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

**Saroj Kaushik, Ph.D. (IIT Delhi)**  
Artificial Intelligence, Location Based Services.  
Department of Computer Science & Engineering

**Smruti Ranjan Sarangi, Ph.D. (University of Illinois)**  
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)**  
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

**Ashish Suri, M.Ch. Neurosurgery (AIIMS, Delhi)**  
Professor, Department of Neurosurgery, AIIMS, Delhi  

**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)**  
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:
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
James Gomes, Ph.D. (Tulane Univ.)
Professor
Systems and Network Biology, Neurodegeneration.

Manidipa Banerjee, Ph.D. (UCSD)
Assistant Professor
Hepatitis A Virus Entry, Using Viruses as Nanoparticles for drug delivery.

Tapan K. Chaudhuri, Ph.D. (Bose Institute)
Professor
Chaperone Assisted Protein Folding, Protein Engineering and Molecular Biophysics.

Archana Chugh, Ph.D. (Delhi Univ.)
Assistant Professor
Cell Penetrating Peptides, Marine Bioprospecting, Plant-based Therapeutics.

Chinmoy S. Dey, Ph.D. (Jadavpur Univ.)
Professor
Insulin Resistant (Type 2) Diabetes and Leishmaniasis, Signal Transduction.

Seyed E. Hasnain, Ph.D. (JNU)
Professor
M. tuberculosis Molecular Epidemiology, Functional Biology, New interventions and diagnostics.

B. Jayaram, Ph.D. (City Univ. NY)
Professor
Computational Biology, Molecular Design.

Bishwajit Kundu, Ph.D. (Inst. of Microbial Tech.)
Associate Professor
Protein Misfolding and Aggregation.

Aditya Mittal, Ph.D. (Drexel Univ.)
Professor
Kinetics and Self Assembly in Biological Systems.

Vivekanandan Perumal, Ph.D. (CMC Vellore)
Assistant Professor
Hepatitis B Virus, Hepatocellular Carcinoma, microRNA in Liver Cancer.

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 a 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 Accelyrs 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 regulary.

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.DE./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:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Official</th>
<th>Status</th>
<th>Nominee of</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dy. Director (Strategy and Planning)</td>
<td>Chairman</td>
<td>Director</td>
</tr>
<tr>
<td>2</td>
<td>Dy. Director (Operations)</td>
<td>Member</td>
<td>Ex-officio</td>
</tr>
<tr>
<td>3</td>
<td>Dean (R&amp;D)</td>
<td>Member</td>
<td>Ex-officio</td>
</tr>
</tbody>
</table>
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 HR TEM**

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
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

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.
4. Micro Raman Spectroscope

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:
Prof. Ashwini K. Agrawal
(Department of Textile Technology)
Tel: +91-11-26591415
E-mail: ashwini@textile.iitd.ac.in

Prof. Manjeet Jassal
(Department of Textile Technology)
Tel: 011-26591426
E-mail: manjeet@textile.iitd.ernet.in
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:**

Prof. Ashwini K. Agrawal  
(Department of Textile Technology)  
**Tel:** 011-26591415  
**E-mail:** ashwini@textile.iitd.ac.in

Prof. Manjeet Jassal  
(Department of Textile Technology)  
**Tel:** 011-26591426  
**E-mail:** manjeet@textile.iitd.ernet.in

*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 (31P-15N) measurement and measurement under variable temperature (VT) are also possible in this system.

**Faculty Coordinators:**

Prof. Ashwini K. Agrawal  
(Department of Textile Technology)  
**Tel:** +91-11-26591415  
**E-mail:** ashwini@textile.iitd.ac.in

Prof. Manjeet Jassal  
(Department of Textile Technology)  
**Tel:** 011-26591426  
**E-mail:** manjeet@textile.iitd.ernet.in

*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, adopters; 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 semesters 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](image1)

![RFID based Wireless Inventory Management System](image2)
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://panit.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 AVAILABLE 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
• Indiastat.com
• INFORMS Current Journals
• INSIGHT
• IoP Science extra and their Archival collection
• ISI Emerging Markets - EMIES
• ISID
• Jgate+JCCC
• JOVE Biology
• JOVE Physics
• JSTOR
• 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:

- Springer’s Electronic Books (about 100 e-books) (http://ebooks.springerlink.com)
- Wiley InterScience Electronic Books (about 100 e-books)
- Myilibrary
- 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.
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Prof. S.K. Gupta : Student Affairs
Prof. K.S. Rao : Infrastructure

Associate Deans
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Prof. (Ms.) Manju Mohan : Student Welfare
Prof. Neeraj Kumar Jha : Infrastructure
Dr. B.K. Panigrahi : Infrastructure

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THE SENATE

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(Director)

Deputy Directors
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M. Balakrishnan

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V.K. Agarwal
Ashwini K. Agarwal
Suhail Ahmad
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R. Algirusamy
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Anshul Kumar
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Viresh Dutta
S.G. Deshmukh
Anupam Dewan
Chinmoy Sarkar Dey
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S.K. Gupta (Ch.E.)
Seyed 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.)

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

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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)
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Student Affairs Council

Naresh Bhatnagar  
Industrial Research and Development Board

Anurag Sharma  
Board for Academic Programmes

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Board for Students Publications

Jyoti Kumar  
Board of Recreational and Creative Activities

P.M.V. Subbarao  
Associate Dean (HM) Ex-Officio

Manju Mohan (Ms.)  
(Vice Chairman)

Student Teacher Interaction Committee

Manju Mohan (Ms.)  
(President)

Associate Dean (SW) Ex-Officio

Anil Saroha  
Board for Sports Activities

(President)

Manju Mohan (Ms.)  
Board for Students Welfare

(President)

Associate Dean (SW) Ex-Officio

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.)  Head, Counselling Service
President BSW (Ex-Officio)

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

Research Programme

Geetam Tiwari (Ms.)  Transportation Research and Injury Prevention Programme (TRIPP)

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)

<table>
<thead>
<tr>
<th>Name</th>
<th>Facility</th>
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</thead>
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<tr>
<td>N.D. Kurur</td>
<td>NMR</td>
</tr>
<tr>
<td>Sujeet Chaudhary</td>
<td>Liquid Nitrogen</td>
</tr>
<tr>
<td>Kushal Sen</td>
<td>SEM</td>
</tr>
<tr>
<td>Sameer Sapra</td>
<td>Glass Blowing Workshops</td>
</tr>
<tr>
<td>G.B. Reddy</td>
<td>TEM</td>
</tr>
<tr>
<td>B.R. Mehta</td>
<td>AFM+STM (Atomic Force Microscope+Scanning Tunneling Microscope)</td>
</tr>
<tr>
<td>Vikram Kumar</td>
<td>Nanoscience Research Facility</td>
</tr>
</tbody>
</table>

## CENTRAL WORKSHOP

Professor and Head: P.V. Madhusudan Rao

## CHAIRMEN OF OTHER COMMITTEES

<table>
<thead>
<tr>
<th>Name</th>
<th>Committee</th>
</tr>
</thead>
<tbody>
<tr>
<td>V. Ramgopal Rao</td>
<td>Official Language Implementation Committee</td>
</tr>
<tr>
<td>Anurag Sharma</td>
<td>Institute Lecture Series Committee</td>
</tr>
<tr>
<td>Anurag Sharma</td>
<td>Standing Committee for Convocation 2014</td>
</tr>
<tr>
<td>Anurag Sharma</td>
<td>Kendriya Vidyalaya Management Committee</td>
</tr>
<tr>
<td>Anurag Sharma</td>
<td>Nursery &amp; K.G. School Advisory Committee</td>
</tr>
<tr>
<td>K.S. Rao</td>
<td>Commercial Establishments &amp; Licencing Committee</td>
</tr>
<tr>
<td>K.S. Rao</td>
<td>Commercial Establishments Monitoring Committee</td>
</tr>
<tr>
<td>K.S. Rao</td>
<td>House Allotment Committee</td>
</tr>
<tr>
<td>K.S. Rao</td>
<td>Air-conditioning Committee</td>
</tr>
<tr>
<td>M.P. Gupta</td>
<td>Committee for House Building and other Advances</td>
</tr>
<tr>
<td>G.B. Reddy</td>
<td>Hospital Advisory Committee</td>
</tr>
<tr>
<td>T.C. Kandpal</td>
<td>Employees Welfare Committee</td>
</tr>
<tr>
<td>M. Balakrishnan</td>
<td>Institute Grievance Committee</td>
</tr>
<tr>
<td>S.K. Gupta</td>
<td>Managing Committee for Eating Outlets</td>
</tr>
<tr>
<td>S.N. Singh</td>
<td>Security Advisory Committee</td>
</tr>
<tr>
<td>S.N. Singh</td>
<td>Managing Committee of the Benevolent Fund Scheme</td>
</tr>
<tr>
<td>S.N. Singh</td>
<td>Executive Committee of IITD Staff Welfare Scheme</td>
</tr>
</tbody>
</table>
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  : Sudipto Mukhejree (Planning)
Prof.-in-Charge  : Tapan K. Chaudhari (Guest Houses/Halls)
Prof.-in-Charge  : Shashi Mathur (Training & Placement)
Prof.-in-Charge  : Nalin Pant (EHLS Unit)

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

CVC
Chief Vigilance Officer  S.S. Yadav

RTI
Public Information Officer  K.K. Bhattacharjee
Appellate Authority  Sandeep Chatterjee, Registrar

HOSPITAL SERVICES
Head  Brahm Prakash
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 unfeigned spirit of exploration, rationality and enterprise.

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………………………………………………
Enter No………………………………………
Indian Institute of Technology Delhi
Hauz Khas, New Delhi-110 016 (India)