INDIAN INSTITUTE OF TECHNOLOGY DELHI
GOLDEN JUBILEE

INDIAN INSTITUTE OF
TECHNOLOGY DELHI

Prospectus

2010-2011

INDIAN INSTITUTE OF TECHNOLOGY DELHI

IIT DELHI

Vision

To contribute to India and the world through excellence in scientific and technical education and research; to serve as a valuable resource for industry and society; and to 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 view 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.
- A unfettered spirit of exploration, rationality and enterprises.

PROSPECTUS

2010-2011

Indian Institute of Technology Delhi
Hauz Khas, New Delhi

Information in this book and more details are available at the IIT Delhi website :

http://www.iitd.ac.in
or
http://www.iitd.ernet.in

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CONTENTS

1. INTRODUCTION

Indian Institute of Technology Delhi is one of the fifteen Institutes of Technology created as 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 an Institution of National Importance under the "Institutes of Technology (Amendment) Act, 1963" and was renamed "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.

HRH Prince Philip, the Duke of Edinburgh, laid the foundation stone of the Institute on January 27, 1959. The academic activities of the Institute started on August 16, 1961 with the arrival of first batch of students on campus and the formal inauguration of the teaching activity was done by Prof. Humayun Kabir, the then Union Minister for Scientific Research and Cultural Affairs on August 17, 1961. The main academic complex of the Institute was opened by Dr. Zakir Hussain, the then President of India on March 2, 1968. The Institute celebrated its silver Jubilee during 1985-86 and the Silver Jubilee Convocation was addressed by Shri Rajiv Gandhi, the then Prime Minister on December 19, 1985. The Institute has made a notable mark in higher technical education and research. It has been ranked very high among national and international institutions of higher learning. The Institute will be celebrating its Golden Jubilee Year starting August 16, 2010.

Location

IIT Delhi is situated at 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.

Campus

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 site being longitudinal in shape, the last two zones have been located mid-way between the two residential zones in order to reduce walking distance.

The main academic building accommodates various teaching and research activities. Though each department/ centre is a separate entity, they constitute an integrated complex. Heavy engineering laboratories are placed on the ground floor, light laboratories on the first floor while the tutorial rooms, classrooms and project rooms are located on the second floor. Separate offices have been provided to every member of the teaching staff next to his laboratory. Large lecture theatres with modern amenities and equipment for sound and projection are located in the courtyards between departments for common use. 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 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 constructed in modern style is an added amenity to the centre.

Administration

I.I.T. 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 activities of these Institutes. The Minister for Human Resource Development of the Government of India is the Chairman of the Council. Each Institute of Technology has a Board of Governors responsible for its overall administration and control. Mr.Rameshwar Pal Agrawal is the Chairman of the Board of Governors of this Institute.

The Senate decides the academic policy of the Institute, and approves curriculum, courses and examination results. It appoints committees to look into specific academic matters arising from time to time. The teaching, training and

research activities of various departments at the Institute are constantly under review to improve both facilities and standard. The Director of the Institute is the Chairman of the Senate. Financial advice to the Institute is rendered by the Finance Committee. Similarly, there is a Buildings and Works Committee to advise on matters relating to buildings and works activity. These committees are appointed by the Board of Governors.

In addition, there are a number of other committees like the Board of Undergraduate Studies, Board of Postgraduate Studies and Research, Board of Educational Research and Planning etc. appointed by the Senate to help the administration in the efficient running of the Institute.

Academic System

I.I.T. 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. 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. Departmental courses (core and electives) constitute 50% of the total curriculum. Further, students do open category electives to develop broad inter-disciplinary knowledge base or to specialize significantly in an area outside his parent discipline. At the postgraduate level, students are encouraged to look beyond their area of specialization to broaden their horizons through open electives.

The medium of instruction in the Institute is English.

The Institute follows the semester system. An academic year runs from July through June next year and is comprised of three semesters. Typically, the 1st semester starts in the last week of July and ends in the 2nd week of December; the 2nd semester starts in the last week of December/first week of January and ends in the 2nd week of May. The summer semester starts in the 3rd week of May and ends in the 2nd week of July. Detailed schedule is given in the *Semester Schedule* that is available before the start of the semester.

Academic Structure

The major academic units of the Institute are the department, centre and school. Interdisciplinary research is organized in programmes. The various academic units are listed in Tables 1-3, and details are given later 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.

Table 1. Departments of IIT Delhi.

Name of Department (alphabetical order)	**Code**
Department of Applied Mechanics	**AM**
Department of Biochemical Engineering and Biotechnology (Dual-degree entry no. 'BB')	**BE**
Department of Chemical Engineering	**CH**
Department of Chemistry	**CY**
Department of Civil Engineering	**CE**
Department of Computer Science and Engineering	**CS**
Department of Electrical Engineering	**EE**
Department of Humanities and Social Sciences	**HU**
Department of Management Studies	**SM**
Department of Mathematics	**MA**
Department of Mechanical Engineering	**ME**
Department of Physics (Engineering Physics courses start with 'EP')	**PH**
Department of Textile Technology	**TT**

Table 2. Centres at IIT Delhi.

Name of Centre (alphabetical order)	**Code**
Centre for Applied Research in Electronics	**CR**
Centre for Atmospheric Sciences	**AS**
Centre for Biomedical Engineering	**BM**
Centre for Energy Studies	**ES**
Industrial Tribology, Machine Dynamics and Maintenance Engineering Centre	**IT**
Instrument Design and Development Centre	**ID**
Centre for Polymer Science and Engineering	**PS**
Centre for Rural Development and Technology	**RD**
National Resource Centre for Value Education in Engineering	**VE**

Table 3. Schools at IIT Delhi.

Name of School (alphabetical order)	**Code**
Amar Nath and Shashi Khosla School of Information Technology	**SI**
Bharti School of Telecommunication Technology and Management	**BS**
School of Biological Sciences	**BL**

Research and Innovation

IIT Delhi places strong emphasis on research and development, and innovation. The faculty undertake research in their fields of interest. Many postgraduate students and some undergraduate students are also involved in these activities; the curriculum provides facilities for the same. While some research is funded by the Institute, mostly, it is 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 and Research Development (IRD) unit. Innovative technology development and industrial outreach are facilitated by the Foundation for Innovation and Technology Transfer (FITT), a non-profit society associated with IIT Delhi and located on-campus.

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 the knowledge. The Institute has more than ninety Memoranda of Understanding with different Organizations/ Institutes from countries all over the world which include France, Germany, USA, Canada, UK, Australia, Japan, Switzerland, Korea, China, and Ethiopia. A large number of collaborative projects and student exchanges are ongoing 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, Department of Atomic Energy, MHRD etc.

Besides, the Institute has been undertaking Consultancy Assignments with International Organisations like 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.

Student Exchange

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

2. ACADEMIC PROGRAMMES

IIT Delhi offers a variety of academic programmes for students with a wide range of backgrounds. Admission to many of these programmes are based on performance in national level tests / entrance examinations followed by interviews in some cases. Details are given in *Courses of Study 2010-2011.*

The programmes offered by IIT Delhi are presently classified as undergraduate and postgraduate programmes. This classification is based primarily on entry/admission qualification of students rather than the level of degree offered. For all undergraduate programmes, students are admitted after 10+2 schooling while for all postgraduate programmes, students are admitted after they have obtained at least a college level Bachelor's degree. There is considerable overlap in courses for senior undergraduate students and junior postgraduate students. The various programmes and their specialization are listed below.

2.1 UNDERGRADUATE PROGRAMMES

A. Bachelor of Technology: (B.Tech.)

Department	Specialization	Code	
Chemical Engg.	B.Tech. in Chemical Engineering	**CH1**	CH
Computer Sc. and Engg.	B.Tech. in Computer Science and Engineering	**CS1**	CS
Civil Engg.	B.Tech. in Civil Engineering	**CE1**	CE
Electrical Engg.	B.Tech. in Electrical Engineering	**EE1**	EE
	B.Tech. in Electrical Engineering (Power)	**EE2**	EP
Mechanical Engg.	B.Tech. in Mechanical Engineering	**ME1**	ME
	B.Tech. in Production and Industrial Engineering	**ME2**	PE
Physics	B.Tech. in Engineering Physics	**PH1**	PH
Textile Technology	B.Tech. in Textile Engineering	**TT1**	TT

B. Dual-degree: (B.Tech. and M.Tech.)

Department	Specialization	Code	
Biochemical Engg. and Biotechnology	B.Tech. in Biochemical Engineering and Biotechnology, and M. Tech. in Biochemical Engineering and Biotechnology	**BE5**	BB
Chemical Engg.	B.Tech. in Chemical Engineering, and M. Tech. in Chemical Engineering	**CH7**	CC
Computer Sc. and Engg.	B.Tech. in Computer Science and Engineering, and M. Tech. in Computer Science and Engineering	**CS5**	CO
Electrical Engg.	B.Tech. in Electrical Engineering, and M. Tech. in Information and Communication Technology	**EE5**	EI

C. Integrated Master of Technology: (Integrated M.Tech.)

Department	Specialization	Code	
Mathematics	M. Tech. in Mathematics and Computing	**MT5**	MT

The Institute is accredited by the following professional institutions in India and abroad for the purpose of exemption from their examinations: 1. Institution of Engineers (India); 2. Ministry of Transport & Shipping, Government of India, Directorate General of Shipping, Bombay; 3. Institution of Electronics & Telecommunication Engineers (India); 4. Institution of Electrical Engineers, London; 5. Textile Institute, U.K.

The degrees are also accredited by the Association of Indian Universities and the Association of Commonwealth Universities.

2.2 POSTGRADUATE PROGRAMMES

A. Postgraduate Diploma

Department	Specialization	Code
Applied Mechanics	D.I.I.T (Naval Construction) (for candidates sponsored by the Indian Navy)	**AMX**
Civil Engineering	PG Diploma in Metro Rail Transport: Technology and Management (for candidates sponsored by DMRC)	**CEX**

The DIIT is also available in every corresponding Master of Technology programme listed in Item E below. It is awarded only to those students who have been able to complete only partially the corresponding M.Tech. degree requirements. For details see *Section 5.6 in Courses of Study*.

B. Master of Science: (M.Sc.)

Department	Specialization	Code
Chemistry	M.Sc. in Chemistry	**CYS**
Mathematics	M.Sc. in Mathematics	**MAS**
Physics	M.Sc. in Physics	**PHS**

C. Master of Business Administration: (M.B.A.)

Department	Specialization	Code
Management Studies	M.B.A. (with focus on Management Systems)	**SMF**
	M.B.A. (with focus on Telecommunication Systems Management)	**SMT**
	M.B.A. (with focus on Technology Management) (part-time evening programme)	**SMN**

D. Master of Design: (M.Des.)

	Specialization	Code
Interdisciplinary	Master of Design in Industrial Design	**JDS**

E. Master of Technology: (M.Tech.)

Department/Centre	Specialization	Code
App Mechanics	M.Tech. in Engineering Mechanics	**AME**
	M.Tech. in Design Engineering	**AMD**
Chemical Engg.	M.Tech. in Chemical Engineering	**CHE**
Chemistry	M.Tech. in Molecular Engineering : Chemical Synthesis & Analysis	**CYM**
Civil Engg.	M.Tech. in Geotechnical and Geoenvironmental Engineering	**CEG**
	M.Tech. in Rock Engineering and Underground Structure	**CEU**
	M.Tech. in Structure Engineering	**CES**
	M.Tech. in Water Resources Engineering	**CEW**
	M.Tech. in Construction Engineering and Management	**CET**
	M.Tech. in Construction Technology and Management (Ü)	**CEC**
	M.Tech. in Environmental Engineering and Management	**CEV**
	M.Tech. in Transportation Engineering	**CEP**
Computer Science & Engg.	M.Tech. in Computer Science and Engineering	**MCS**

Electrical Engineering	M.Tech. in Communications Engineering	**EEE**
	M.Tech. in Computer Technology	**EET**
	M.Tech. in Control and Automation	**EEA**
	M.Tech. in Integrated Electronics and Circuits	**EEN**
	M.Tech. in Power Electronics, Electrical Machines and Drives	**EEP**
	M.Tech. in Power Systems	**EES**
Mechanical Engineering	M.Tech. in Design of Mechanical Equipment	**MED**
	M.Tech. in Industrial Engineering	**MEE**
	M.Tech. in Production Engineering	**MEP**
	M.Tech. in Thermal Engineering	**MET**
Physics	M.Tech. in Applied Optics	**PHA**
	M.Tech. in Solid State Materials	**PHM**
Textile Technology	M.Tech. in Fibre Science & Technology	**TTF**
	M.Tech. in Textile Engineering	**TTE**
Centre for Applied Research in Electronics	M.Tech. in Radio Frequency Design and Technology	**CRF**
Centre for Atmospheric Sciences	M.Tech. in Atmospheric-Oceanic Science and Technology	**AST**
Interdisciplinary Programmes	M.Tech. in Computer Applications	**JCA**
	M.Tech. in Energy Studies	**JES**
	M.Tech. in Energy and Environmental Management	**JEN**
	M.Tech. in Industrial Tribology and Maintenance Engineering	**JIT**
	M.Tech. in Instrument Technology	**JID**
	M.Tech. in Optoelectronics and Optical Communication	**JOP**
	M.Tech. in Polymer Science and Engineering	**JPT**
	M.Tech. in Telecommunication Technology Management	**JTM**
	M.Tech. in VLSI Design Tools and Technology (*)	**JVL**

NOTE: (*) These are sponsored programmes.

F. Master of Science (Research): M.S.(R)

The Master of Science (Research) programme is offered by the following departments, centres and schools:

Department/School	Code
Applied Mechanics	**AMY**
Bharti School of Telecommunication Technology and Management	**BSY**
Biochemical Engineering and Biotechnology	**BEY**
Chemical Engineering	**CHY**
Civil Engineering	**CEY**
Computer Science and Engineering	**CSY**
Electrical Engineering	**EEY**
Mechanical Engineering	**MEY**
Amar Nath and Shashi Khosla School of Information Technology	**SIY**

G. Doctor of Philosophy: (Ph.D.)

All departments, centres and schools listed in Table 1-3 offer the Ph.D. programme except NRCVEE.

2.3 CREDIT SYSTEM

Education at the Institute is organized around the semester-based credit system of study. The prominent features of the credit system are a process of continuous evaluation of a student's performance/progress and flexibility to allow a student to progress at an optimum pace suited to his/her ability or convenience, subject to fulfilling minimum requirements for continuation.

A student is allowed to attend classes in a course and earn credit for it, **only if** he/she has registered for that course.

A student's performance/progress is measured by the number of credits that he/she has earned, i.e. completed satisfactorily. Based on the course credits and grade obtained by the student, grade point average is calculated. A minimum grade point average is required to be maintained for satisfactory progress and continuation in the programme. Also a minimum number of earned credits and a minimum grade point average should be acquired in order to qualify for the degree.

All programmes are defined by the total credit requirement and a pattern of credit distribution over courses of different categories.

Details are given in *Courses of Study.*

(a) Course credits assignment

Each course, except a few special courses, has a certain number of credits assigned to it depending upon its lecture, tutorial and laboratory contact hours in a week. This weightage is also indicative of the academic expectation that includes in-class contact and self-study outside of class hours. A few courses are without credit and are referred to as non-credit (NC) courses.

Lectures and Tutorials : One lecture or tutorial hour per week per semester is assigned one credit.

Practical/Laboratory : One laboratory hour per week per semester is assigned half credit.

For each lecture or tutorial credit, the self study component is 1 hour/week (for 100-600 level courses) and 2 hours/week (for 700-800 level courses). In the above example, the student is expected to devote 3 + 1 = 4 hours per week on self study for this course, in addition to class contact of 5 hours per week.

(b) Earning credits

At the end of every course for which a student has registered, a letter grade is awarded in each course for which a student had registered. On obtaining a pass grade, the student accumulates the course credits as earned credits. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average. A student has the option of auditing some courses. Grades obtained in these audit courses are not counted for computation of grade point average. However, a pass grade is essential for earning credits from an audit course; this does not apply to postgraduate programmes.

(c) Course coordinator

Every course is usually coordinated by a member of the teaching staff of the Department/Centre/School which is offering the course in a given semester. For some courses, faculty from other departments/centres or even guest faculty participates in the teaching and/or coordination of a course. This faculty member is designated as the *Course Coordinator*. He/she has the full responsibility for conducting the course, coordinating the work of the other members of the faculty as well as teaching assistants involved in that course, holding the tests and assignments, and awarding the grades. For any difficulty related to a course, the student is expected to approach the respective course coordinator for advice and clarification. The distribution of the weightage for tests, quizzes, assignments, laboratory work, workshop and drawing assignment, term paper, etc. that will be the basis for award of grade in a course will be decided by the course coordinator of that course and generally announced at the start of the semester.

2.4 GRADING SYSTEM

The grading reflects a student's own proficiency in the course. While relative standing of the student is clearly indicated by his/her grades, the process of awarding grades is not necessarily based upon fitting performance of the class to some statistical distribution. The course coordinator and associated faculty for a course formulate appropriate procedure to award grades that are reflective of the student's performance *vis-à-vis* instructor's expectation.

The credit system enables continuous evaluation of a student's performance, and allows the students to progress at an optimum pace suited to individual ability and convenience, subject to fulfilling minimum requirement for continuation.

The grades and their description, along with equivalent numerical points where applicable are listed inTable 4. Further details are given in the Courses of Study booklet.

Table 4. Grades and their description.

Grade	Grade points	Description
A	10	Outstanding
A (-)	9	Excellent
B	8	Very good
B (-)	7	Good
C	6	Average
C (-)	5	Below average
D	4	Marginal
E	2	Poor
F	0	Very poor
I	-	Incomplete
NP	-	Audit pass
NF	-	Audit fail
W	-	Withdrawal
X	-	Continued
S	-	Satisfactory completion
Z	-	Course continuation

2.5 EVALUATION OF PERFORMANCE

The performance of a student will be evaluated in terms of three indices, viz. the Semester Grade Point Average (SGPA) which is the Grade Point Average for a semester, Cumulative Grade Point Average (CGPA) which is the Grade Point Average for all the completed semesters at any point in time, and Degree Grade Point Average (DGPA).

The Earned Credits (EC) are defined as the sum of course credits for courses in which A – D or NP or S grades have been obtained.

Points earned in a semester = Σ (Course credits x Grade point) for courses in which A - D grade has been obtained)

The SGPA is calculated on the basis of grades obtained in all courses, except audit courses and courses in which S/Z grade is awarded, registered for in the particular semester.

$$\text{SGPA} = \frac{\text{Points secured in the semester}}{\text{Credits registered in the semester, excluding audit and S/Z grade courses}}$$

The CGPA is calculated on the basis of all pass grades, except audit courses and courses in which S/Z grade is awarded, obtained in all completed semesters.

$$\text{CGPA} = \frac{\text{Cumulative points secured in all passed courses (A-D grade)}}{\text{Cumulative earned credits, excluding audit and S/Z grade courses}}$$

An example of these calculations is given in table 5.

Table 5(a). Typical academic performance calculations - I semester

Course no.	Course credits	Grade awarded	Earned credits	Grade points	Points secured
(column 1)	(column 2)	(column 3)	(column 4)	(column 5)	(column 6)
MALXXX	5	C	5	6	30
CSLXXX	4	C(-)	4	5	20
PHLXXX	4	A	4	10	40
PHPXXX	2	B	2	8	16
MELXXX	4	E	0	2	08
TTNXXX	2	S	2	–	–

Credits registered in the semester *(total of column 2)* = 21
Credits registered in the semester excluding audit and S/Z grade courses = 19
Earned credits in the semester *(total of column 4)* = 17
Earned credits in the semester excluding audit & S/Z grade courses= 15
Points secured in this semester *(total of column 6)* = 114
Points secured in this semester in all passed courses *(total of column 6 with A-D grade in courses)* = 106

$$\text{SGPA} = \frac{\text{Points secured in the semester}}{\text{Credits registered in the semester, excluding audit and S/Z grade courses}} = \frac{114}{19} = 6.000$$

$$\text{CGPA} = \frac{\text{Cumulative points secured in all passed courses (A-D grade)}}{\text{Cumulative earned credits, excluding audit and S/Z grade courses}} = \frac{106}{15} = 7.067$$

Semester performance: Earned credits (E.C.) = 17 SGPA = 6.000
Cumulative performance: Earned credits (E.C.) = 17 CGPA = 7.067

Table 5(b). Typical academic performance calculations - II semester

Course no.	Course credits	Grade awarded	Earned credits	Grade points	Points secured
(column 1)	(column 2)	(column 3)	(column 4)	(column 5)	(column 6)
MALXXX	5	B	5	8	40
EELXXX	4	A(-)	4	9	36
CYLXXX	4	W	–	–	–
CYPXXX	2	B(-)	2	7	14
MELXXX	4	C	4	6	24
AMLXXX	4	A	4	10	40
HUNXXX	1	S	1	–	–

Credits registered in the semester *(total of column 2)* = 24
Credits registered in the semester excluding audit and S/Z grade courses = 23
Earned credits in the semester *(total of column 4)* = 20
Earned credits in the semester excluding audit & S/Z grade courses= 19
Points secured in this semester *(total of column 6)* = 154
Points secured in this semester in all passed courses *(total of column 6 with A-D grade in courses)* = 154
Cumulative points earned in all passed courses = 106 (past semesters) + 154 (this sem.) = 260

Cumulative earned credits = 17 (past semesters) + 20 (this sem.) = 37

$$\text{SGPA} = \frac{\text{Points secured in the semester}}{\text{Credits registered in the semester, excluding audit and S/Z grade courses}} = \frac{154}{19} = 8.105$$

$$\text{CGPA} = \frac{\text{Cumulative points secured in all passed courses (A-D grade)}}{\text{Cumulative earned credits, excluding audit and S/Z grade courses}} = \frac{106 + 154}{15 + 19} = 7.647$$

Semester performance	:	Earned credits (E.C.) = 20	SGPA = 8.105
Cumulative performance	:	Earned credits (E.C.) = 37	CGPA = 7.647

On completing all the degree requirements, the degree grade point average, DGPA, will be calculated and this value will be indicated on the degree/diploma. The DGPA will be calculated on the basis of category-wise best valid credits required for graduation.

A student who has earned the requisite credits but does not meet the graduation DGPA requirement, may do additional courses in any elective category to meet the DGPA requirement within the maximum permissible time limit. Further details are given in the Courses of Study.

2.6 DEGREE REQUIREMENTS

Detailed requirements for degree completion are given in Courses of Study booklet. Some main features are listed here.

2.6.1 Undergraduate degree requirements (B.Tech., Dual Degree and Integrated M.Tech. Programmes)

The degree requirements for the various programmes listed earlier are detailed below.

(i) Earned credits

(a) Completion of 180 earned credits for 4-year B. Tech. Programmes.

(b) Completion of 216 earned credits for Integrated M.Tech. Programme in Mathematics and Computing.

(c) For the Dual-degree programmes, completion of 168-170 earned credits for the B. Tech. degree and 48-50 earned credits for the M. Tech. degree.

These credits are needed to be earned under different categories as specified in the Courses of Study booklet for individual programmes.

(ii) Degree Grade Point Average (DGPA) Requirement

A student must obtain a Degree Grade Point Average (DGPA) of 5.0 to be eligible for award of the B.Tech. degree and 5.5 for the Integrated M.Tech. degree. The minimum DGPA requirement for M.Tech. part of the Dual-degree programme is 6.0.

(iii) Practical training

A student of the B.Tech., Dual-degree and Integrated M.Tech. programmes must complete the prescribed number of days of practical training to the satisfaction of the concerned department. This training will be normally arranged in the summer vacation following the 6th semester. Practical training duration is a minimum of 50 working days. Practical training should be carried out preferably in industry or R&D institutions in India. Practical training in academic institutions is not allowed.

(iv) NCC/NSS/NSO

All students are required to enroll for either one of NCC, NSS or NSO in their first year. For details refer to section 4.8 in the "Courses of Study" booklet.

(v) Break-up of earned credits

The minimum earned credit requirements for the B.Tech., Dual-degree and Integrated M.Tech. programmes along with detailed break-up of the credits in various categories are given in table 6.

Table 6. Degree requirements of undergraduate programmes

	Category	Symbol	Programme		
			B.Tech. (4-year)	Dual-degree	Integrated M.Tech.
1	UG Core	UC	112	99-112	133 (IC)
1.1	Departmental core	DC	54 (min.)	48-50 (min.)	90
1.2	Basic Sciences	BS	20 (min.)	20 (min.)	20 (min.)
1.3	Engineering Arts and Sciences	EAS	20 (min.)	20 (min.)	20 (min.)
1.4	Humanities and Social Sciences	HU	2	2	2
2	UG Elective	UE	68	68	83 (IE)
2.1	Departmental electives	DE	26 (min.)	20 (min.)	40
2.2	Humanities and Social Sciences	HM	14	14	14
2.3	Open category	OC	25 (min.)	25 (min.)	30
3	Departmental requirement	DR (=DC+DE)	90	78-80	130
4	TOTAL REQUIREMENT (B.Tech./Integrated)	UR (=UC+UE)	180	168-170	216
5	M.Tech REQUIREMENT	PR	—	48-50	—
5.1	Programme core	PC	—	32	—
5.2	Programme elective	PE	—	16-18	—
6	TOTAL M.Tech. REQUIREMENT	PR(=PC+PE)	—	48-50	—
7	TOTAL REQUIREMENT (Dual-degree)	UR+PR	—	216-218	—

Maximum of 8 credits under open category can be taken from the departmental U.G. or P.G. courses and other programme-relevant courses as identified by the department.

For completing graduation requirements, a student must complete a minimum of 8 credits of Mathematics category courses, and 6 credits each of Physics and Chemistry category courses with a valid pass grade.

A student must also earn valid credits (audit not permitted) for a course of Environment Studies Category under OC for graduation.

For complete details, please refer to *Courses of Study*.

(vi) Maximum duration for completing degree requirements

1. The maximum permitted duration of each programme will be determined in terms of number of registered regular semesters, hereinafter called registered semesters. Any semester in which a student has registered for a course will be called a registered semester subject to the following:

(a) Only the 1st and 2nd semesters of an academic year can be registered semesters. The summer semester will not be considered as a registered semester.

(b) A semester when a student has been granted semester withdrawal (SW) or granted leave (SL) will not be considered as a registered semester.

(c) The semester when a student is suspended from the Institute on disciplinary grounds will not be counted towards the number of registered semesters.

The summer semesters falling in between the permitted registered semesters shall be available for earning credits. After the student has registered for the maximum permissible number of registered semesters, the subsequent summer semesters will not be available for earning credits.

2. The maximum permissible number of registered semesters for completing all degree requirements are given in Table 7.

Table 7. Maximum permissible duration for completing degree requirements.

Programme Name	Maximum number of registered semesters permitted for completing degree requirements
B.Tech.	12 (*)
Dual-degree	14 (*)
Integrated M.Tech.	14 (*)

Note: (*) If a student opts for the slow-paced programme (as defined in Para 2.6.2), then the maximum permissible number of registered semesters shall be increased by two semesters.

Conditions for termination of registration, probation and warning

(vii) For students admitted through JEE

(a) If a student cannot earn a stipulated number of credits (for GE/OBC:26; for SC/ST/PH:22) after two registered semesters, then he/she will have the option to re-start or else his/her registration will be terminated.

(b) If a student chooses to restart after the first two registered semesters, then his/her credits earned and semesters registered will not be carried over. The re-start will be indicated on the transcript. The re-start will be permitted only once. If at the end of two registered semesters after re-start, the earned credits are less than or equal to 26 for GE/OBC or less than or equal to 22 for SC/ST/PD students, then the registration will be terminated.

(c) Each student is expected to earn atleast 12 credits in the first registered semester and 15 credits in each subsequent registered semester with a SGPA greater than or equal to 5.0. If the performance of a student at the end of any registered semester is below this minimum acceptable level, then he/she will be placed on probation and a warning shall be given to him/her and intimation sent to the parents.

(d) The student placed on probation shall be monitored, including mandatory attendance in classes, special tutorials and mentoring. Mentoring will comprise structured guidance under a senior/ postgraduate student.

(e) If the performance of a student on probation does not meet the above criterion (b) in the following registered semester, then the student will be permitted to register by the Dean, UGS only if the department makes a favourable recommendation. The Head of the Department's recommendation shall be prepared after consultation with the student, and should include (i) feasibility of completing the programme requirements, and (ii) identification of remedial measures for the problems leading to poor performance.

(f) The registration of any student will be limited to 1.25 times the average earned credits of the previous two registered semesters, subject to a minimum of 15 credits and a maximum of 26 credits.

Slow-paced programme

(i) A student who has earned between 27 and 36 credits at the end of the first two registered semesters will be eligible to opt for the slow-paced programme. A student opting for such a programme shall be permitted two additional registered semesters for completing degree requirements as indicated in Table 7.

(ii) In the slow paced programme, the upper limit for credits registered in a semester will be 18. A student in this programme is expected to earn at least 12 credits with minimum SGPA 5.0 in any semester, falling which he/she will be issued a warning and placed on probation.

The student placed on probation shall be monitored, including mandatory attendance in special tutorials and mentoring.

If the performance of a student on probation does not meet the above criterion in the following registered semester, then the student will be permitted to register by the Dean, UGS only if the department makes a favourable recommendation. The Head of the Department's recommendation shall be prepared after consultation with the student, and should include (i) feasibility of completing the programme, and (ii) identification of remedial measures for the problems leading to poor performance.

(iii) Slow-paced programme shall be defined by the respective department for each student.

2.6.2 Postgraduate degree requirements

(i) Degree requirements

The detailed degree requirements for M.Sc., D.I.I.T., M.B.A., M.Des. M.Tech., M.S. (Research) and Ph.D. degrees are listed in Table 9.

(ii) Maximum duration for completing degree requirements

The maximum permissible time for completing all degree requirements is given in Table 9. The maximum permitted duration of each programme will be determined in terms of number of registered regular semesters, hereinafter called registered semesters. Any semester in which a student has registered for a course will be called a registered semester subject to the following:

(a) Only the 1st and 2nd semesters of an academic year can be registered semesters. The summer semester will not be considered as a registered semester.

(b) A semester when a student has been granted semester withdrawal (SW) or granted leave (SL) will not be considered as a registered semester.

(c) The semester when a student is suspended from the Institute on disciplinary grounds (DW) will not be counted towards the number of registered semesters.

The summer semesters falling in between the permitted registered semesters shall be available for earning credits. After the student has registered for the maximum permissible number of registered semesters, the subsequent summer semesters will not be available for earning credits.

(iii) Condition for continuation of registration

Table 9 gives details of continuation requirements, i.e. minimum performance for continuing as a student; maximum duration for completing degree requirement; failure to maintain the specified academic standing will result in termination of registration and the student's name will be struck-off the rolls.

(iv) Provision for industry internship for postgraduate students

Ph.D. students

Ph.D. students may be allowed to go for internship position in R&D set-ups (Industry as well as Research Laboratories students), subject to the following conditions:

(a) The student shall be permitted to take up the internship on the recommendation of the DRC/CRC upto a period of six months.

(b) No Assistantship shall be paid to the student during the period of internship; and

(c) Normally, the internship periods be aligned to the academic Semester Schedule of the Institute.

M.Tech. students

The M.Tech. students be also allowed to go for optional summer internship between 2nd and 3rd Semester subject to the following conditions:

(a) The concerned students will have to work on the project and stay in the summer after their 2nd year, similar to the current provision for Dual-degree students; and

(b) The place of Internship and/or work plan during internship be approved by the DRC/CRC prior to the student taking it up during the summer between 1_{st} and 2nd year.

Table 9 Continuation of Registration and Graduation Requirements for Postgraduate Programmes

Degree	Registration limits (per semester)	Criteria for continuation of registration	Graduation requirements		
			Valid credits ($)	Minimum DGPA	Max. period of stay
D.I.I.T.[£] (Naval Construction)	Minimum 12 credits Maximum 20 credits	CGPA ≥ 5.0 at the end of each semester.	49	6.0	6 sem. #
M.Sc., Chemistry	Minimum 20 credits Maximum 28 credits	(i) At the end of the 1st registered semester, a student with SGPA of 4.0 or more will be permitted to continue. If the SGPA is less than 4.0 then registration will be terminated. (ii) After the first registered semester, the minimum acceptable performance level in any registered semester is SGPA of 5.0 or more. (iii) If at the end of any registered semester, the SGPA is less than 5.0 then the student will be issued a warning letter and placed on probation; a copy of the warning letter will be sent to the parents. The Chairperson DRC/CRC shall assess the feasibility of completing degree requirements and identify remedial measures for problems leading to poor performance. (iv) The registration of any student will be limited to 1.25 times the average earned credits of the previous two registered semesters, subject to a minimum of 15 credits and a maximum of 26 credits. (v) If a student is on probation and his/her academic performance is below the minimum acceptable level in the following registered semester then his/her registration will be terminated.	90	5.0	6 sem.
M.Sc., Mathematics					
M.Sc., Physics					
M.Tech., full time	Minimum 12 credits Maximum 22 credits with the condition that no. of lecture courses to be not more than 6.	(i) At the end of the 1st registered semester, a student with SGPA of 5.0 or more will be permitted to continue. If the SGPA is less than 5.0 then registration will be terminated. (ii) After the first registered semester, the minimum acceptable performance level in any registered semester is SGPA of 6.0 or more. (iii) If at the end of any registered semester the SGPA is less than 6.0, then the student will be issued a warning letter and placed on probation; a copy of the warning letter will be sent to Chairperson DRC/CRC. The Chairperson DRC/CRC shall assess the feasibility of completing degree requirements and identify remedial measures for problems leading to poor performance. (iv) The registration of any student shall be limited to 1.25 times the average earned credits of the previous two registered semesters, subject to a minimum of 12 credits and a maximum of 22 credits for full time students. (v) If a student is on probation and his/her academic performance is below the minimum acceptable level in the following registered semester then his/her registration will be terminated.	60 (For some M.Tech. programmes the requirement may be more than 60).	6.0	6 sem.
M.Tech., part time	Minimum one course and/or Minor/ Major Project. Maximum 12 credits with the condition that no. of lecture courses to be not more than 3.				10 sem.@
M. Des.	Minimum 18 credits Maximum 30 credits		91.5	6.0	6 sem.
M.B.A., full time	Same as M.Tech. full time		72 + 6 compulsory audit courses.	6.0	6 sem.
M.B.A., part time	Same as M.Tech. part time				10 sem.

M.S. (Res.) full time	See note +	(i) At the end of the 1st registered semester, a student with SGPA of 6.0 or more will be permitted to continue. If the SGPA is less than 6.0 then registration will be terminated. (ii) After the first registered semester, the minimum acceptable performance level in any registered semester is SGPA of 7.0 or more. (iii) If at the end of any registered semester, the SGPA is less than 7.0, then the student should be issued a warning letter and placed on probation; a copy of the warning letter should be sent to the Chairperson DRC/CRC. The Chairperson DRC/CRC shall assess the feasibility of completing degree requirements and identify remedial measures for problems leading to poor performance. (iv) If a student is on probation and his/her academic performance is below the minimum acceptable level in the following registered semester then his/her registration will be terminated. (v) During the research work period, each unsatisfactory performance grade would entail a warning and two consecutive warnings would result in termination of registration.	60 including Thesis.	7.0	6 sem.
M.S. (Res.) part time	See note ++				10 sem.+++
Ph.D.	For details please refer to Ph.D. Ordinances and Regulations	CGPA $\geq$ 7.5. If, at the end of 1st semester, the SGPA is 7.0 or more but less than 7.5, he/she will be required to take more courses to attain a CGPA of 7.5.	12 for B.Tech./M.Sc., 6 for M.Tech. or equivalent; A Deptt./Centre may prescribe additional credits.	7.5 in the course work + Thesis	14 sem.

NOTE:

$ Detailed break-up of core, elective and open category courses are given in the *Courses of Study* bulletin.

£ If a student at the end of the M.Tech. programme fails to complete 60 valid credits with a CGPA of 6.00 or above, he/she still can get a DIIT even though the Department/ Interdisciplinary Programme does not have a regular Diploma programme provided: (i) he/she has a minimum of 45 valid credits; and (ii) he/she has secured a minimum CGPA of 5.50. The request for the award of D.I.I.T. must be made within 5 years of the date of joining the programme.

+ In the first semester the student has to register for a minimum of 15 and a maximum of 20 credits of course work only. In the subsequent 3-semesters the student shall complete the research work and the course work remaining, if any.

++ In the first two semesters the part-time student shall register only for the course work with the minimum and maximum limits of 6-12 credits. The research work and the remaining course work, if any, shall be completed in the remaining 4 semesters. However, the course work must be completed within the first 4-semesters of registration.

+++ The 10 Semester rule for part-time M.S.(Research) students will be applicable only to those who have joined initially as part-time students. For students converting from full-time to part-time the maximum stay limit of 6 semesters will be applicable, subject to recommendations of DRC/CRC and approval by Dean, PGS&R.

@ The 10 Semester rule for part-time M.Tech. students will be applicable only to those who have joined initially as part-time students. For students converting from part-time, the maximum stay limit of 6 semester will be applicable.

The summer semester will not be considered as a registered semester.

3. ADMISSIONS

3.1 UNDERGRADUATE PROGRAMMES

3.1.1 Admission through the Joint Entrance Examination (JEE)

Admission to all Undergraduate Programmes listed in Chapter 2 are made through the Joint Entrance Examination (JEE). Details about the JEE can be obtained from the JEE Office. The eligibility for appearing for JEE is as follows:

(a) The minimum academic qualification in the final examination of 10+2 system or its equivalent is as follows:

i) The candidates belonging to the general category and OBC must secure a minimum of 60% marks in aggregate in their Qualifying Examination. Candidates belonging to SC, ST and PD categories must secure a minimum of 55% marks in aggregate in the Qualifying Examination. If any Board awards only letter grades without providing an equivalent percentage of marks on the grade sheet, the candidate should obtain a certificate from the Board specifying equivalent marks, and submit it at the time of counseling. In case such a certificate is not provided by the candidate, the decision of the Joint Implementation Committee of JEE regarding his/her eligibility shall be final.

ii) A candidate is allowed only two attempts to write JEE. Furthermore, he/she is allowed to write JEE only the year in which he/she passes the qualification examination and/ or in the following year.

iii) Candidates who join any of the IITs, IT-BHU Varanasi and ISM Dhanbad through JEE 2009 will not be permitted to appear in JEE in future.

Those appearing in 10+2 final or its equivalent examination may also appear in JEE for consideration of Provisional admission. All provisional admissions stand cancelled if proof of having passed the qualifying examination (10+2 or equivalent) is not submitted before September 30th of the year in which admission is sought.

(b) Date of Birth: For eligibility criteria for appearing in JEE 2011, please refer to the JEE brochure/website.

3.1.2 Change of programme

(i) Change at the end of first year

The following regulations apply for change of programme at the end of first year.

(a) A student is eligible to apply for change of discipline at the end of first year only, provided he/she satisfies the following criteria:-

(i) CGPA for general category student : 7.50
(ii) CGPA for SC/ST/PH category student : 6.50
(iii) Earned credits at the end of first academic session : 40

(b) Change of the discipline will be permitted strictly in the order of merit as determined by their CGPA at the end of first year subject to the limitation that the actual number of students in the third semester in the discipline to which the transfer is to be made, should not exceed the sanctioned strength and the strength of the discipline from which transfer is being sought does not fall below 90% of existing strength.

(c) For a student with CGPA 9.0 or more, even if a vacancy does not exist, he/she will be permitted to change provided the strength in the discipline to which the change is being sought does not exceed by 5% of the approved strength.

(d) A student with CGPA 9.0 or more will be permitted to change discipline even if strength of discipline from which change is being sought falls below 90% of the existing strength.

(e) Stipulation of minimum credits and CGPA requirements will not be insisted upon for change of discipline to a branch in which a vacancy exists and the concerned student was eligible for admission to that discipline at the time of entry to IIT Delhi. However, requirements of credits and CGPA will continue to apply in case of both general and SC/ST category students seeking change to a discipline to which the concerned student was not eligible for admission at the time of entry to IIT Delhi.

(ii) Change from B.Tech. to Dual-degree Programme

A student registered for a 4-year degree programme in a department can be permitted to change his/her registration from the 4-year to a 5-year programme of the same department provided the B.Tech. part of the Dual-degree Programme into which the student is desirous of registering is the same as the programme for which the student was admitted through JEE subject to fulfilling the following criteria:

(a) The student must have completed at least 120 credits by the end of 6th semester and secured a minimum CGPA of 7.5.

(b) The maximum number of students that can be permitted such a change of registration will be limited to 10% of sanctioned strength of the intake into the relevant 4-year programme of the department.

3.1.3 Casual 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 casual student at IIT Delhi. He/she should be officially sponsored by the Institute/University where he/she is studying. Such a studentship may be granted permission to carry out research or to avail laboratory or other academic facilities or for attending a formal set of courses, for a maximum period of 6 months/one semester. More details may be had from the Deputy Registrar (UGS).

3.1.4 Summer research fellowship

In order to expose students of other Engineering Colleges/Institutes' to the ongoing research activities at IIT Delhi, Institute has introduced Summer Research Fellowship programme for under-graduate students of different engineering Institutes. IIT Delhi will offer fellowship to exceptionally good under-graduate students to execute an innovative research or development project under the guidance of an IIT faculty. The fellowship will cover the cost of travel in the country and stay at IIT Delhi for a period of 8 to 12 weeks which can be availed of during atmost two visits. He/she will be paid a fellowship of Rs. 500.00 per week. The fellow will be expected to register at IIT Delhi as a casual student; he/she will not be required to pay the registration fees but will be required to pay for the insurance charges.

Summer 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 may be had from Deputy Registrar (UGS).

3.2 ADMISSION OF UG STUDENTS TO PG PROGRAMMES WITH ADVANCE STANDING

UG students of IIT Delhi are eligible for admission to PG programmes with advance standing at IIT Delhi. For admission to PG programme, the minimum CGPA required at the end of sixth semester shall be 7.5. The student will be required to complete the major project in both the UG and PG programmes. A student can have maximum of 24 credits of the PG programme waived, based on courses completed as part of the DE or OC category in the UG programme. Details are given in the courses of study booklet.

3.3 POST GRADUATE PROGRAMMES

3.3.1 Eligibility and selection procedure

The admission criteria for admission to all post graduate programmes are listed in Table 10. Keeping in view the number of applications, etc., individual Departments/Centres/Programmes may set a higher eligibility criterion for shortlisting applicants to be called for test/interview. Candidates appearing in the final year examination can also apply. However, the candidates must finish their final qualifying examination including viva-voce, if any, before the date of registration.

3.3.2 Schedule

Admission to Ph.D./M.S.(Research) programme is also possible **any time in the year** through Department Research Committee (DRC) / Centre's Research Committee (CRC) with the approval of Dean, PGS&R, for all categories of scholars. They can be allowed to join any time though the course registration in such cases will be possible only at the beginning of next semester. Candidates seeking admission under this clause must fulfil the required academic qualification/experience at the time of interview. They must also join within 4 weeks after the issue of admission offer failing which they will have to make fresh application.

3.3.3 Procedure for admission

Applications are invited from candidates by advertising the programmes in the Employment News/Newspapers as well as on the Institute wesbite in March/October every year. Subsequently, application forms and information brochures can be obtained as per instructions given in the advertisement.

By the date of registration, the candidate must have appeared in all the examinations including viva-voce, if any, of his/her qualifying degree failing which he/she will not be allowed to register. He/she should also submit a certificate to this effect from the University/Head of the Institution.

All applications are processed by the concerned Department/Centre/School/Programme and shortlisted applicants are called for a written test and/or interview. The date for test/interview is communicated by the Department/Centre/Programme. Selected candidates will be given offer letters by the Departments/Centres/Schools after approval of the selection by the Dean, PGS&R. They will be required to pay the first installment of fees by a given date, failing which their admission offer stands automatically cancelled. Seats so released are then offered to wait listed candidates.

Candidates called for a written test and/or interview for admission to Ph.D. programmes will be paid sleeper / Garib Rath rail fare by the shortest route from the place of residence to Delhi and back. This provision does not apply to sponsored and part-time candidates.

Candidates who have completed all the degree requirements at the time of registration but are unable to submit the degree certificate and other documents may be given provisional admission. This provisional admission will be final after submission of the qualifying degree certificate/other documents latest by 31st October failing which their provisional admission will stand automatically cancelled.

3.3.4 Migration from one PG programme to another P.G. 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. as per details given in the table below:

	M.Tech./ M.S.(R) to Ph.D.	**M.Tech. to MS (R)**	**MS (R) to M.Tech.**
Timing	> 1st Sem.	> 1st Sem. & < 3rd Sem.	> 1st Sem. & < 3rd Sem.
Eligibility	> = 8.0 SGPA/CGPA & > = 12 credits	> = 12 credits	> = 12 credits
Admission	DRC/CRC (Evaluation)	DRC/CRC (Evaluation)	DRC/CRC (Evaluation)
Credits	Credit transfer as recommended by DRC/CRC	Credit transfer as recommended by DRC/CRC	Credit transfer as recommended by DRC/CRC
Duration	Max. 7 years from date of joining M.Tech.	Max. 5 years from date of joining M.Tech.	Max. 5 years from date of joining M.S. (R)

Full-time M.Tech. and M.S.(R) students joining the Ph.D. programme within two years of completion of their M.Tech./M.S.(R) degree will be granted waiver of residency period. Further, the course work requirements can be made up by either additional credits (6 credits as per present norms) taken during this M.Tech./ M.S.(R) period (over and above their minimum degree requirements), or in the summer semester (first or second) by identifying relevant courses. This credit transfer has to be recommended by the respective DRC/CRC.

3.3.5 Admission of foreign nationals

(a) ***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. On receipt of applications of foreign nationals from ICCR, this Institute will examine each case in accordance with its prescribed eligibility criteria for adjudging the academic suitability of the applicant for admission to the desired course/programme. In case the applicant is found suitable for admission and the number of such admissions do not exceed the sanctioned quota for the programme to which admission is sought, he/she will be admitted to the desired programme. Admission offer letter will be sent to him/her by the Office of the Dean,

PGS&R through ICCR. The candidates offered admissions would be required to report for registration at the Institute on the specified date and time which normally takes place in the last week of July. It shall be the responsibility of the prospective foreign students to ensure that their passport show their right type of visa, i.e., their visa must bear the name of IIT Delhi as the Institute of study.

(b) ***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 *curricula vitae*/particulars with regard to their academic qualifications indicating clearly the percentage of marks where marks are awarded; Grade Point Average (GPA) where grades are awarded, etc. Those foreign nationals who have passed their qualifying degree examination from any of the Indian Universities should also have a valid GATE score for admission to M.Tech. programmes and valid CEED score for admission to M.Des. programme. The applications containing detailed information/particulars as aforesaid should be addressed to the *Deputy Registrar (PGS&R), Indian Institute of Technology, Hauz Khas, New Delhi 110 016.* After processing, the Institute will issue provisional offer of admission. On the basis of the letters of admission issued by this Institute, applicants should approach Indian Embassy/High Commission in their respective countries for obtaining 'Student/Research Visa' for study at IIT Delhi. Any foreign national candidate having visa of any other type will be refused admission at IIT Delhi. Fees are payable at the time of Registration, failing which, they will not be registered for the programme.

(c) ***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 under the Memorandum of Understanding will be made in accordance with the terms and conditions spelt out in the MoU agreed to between IIT Delhi and the country/University/Institution concerned.

(d) ***ADB Scholarship Scheme*** : Applicants seeking admission under the ADB Scholarship scheme will be considered for admission only to M.Tech. Programmes. Foreign nationals fulfilling the prescribed qualifications and belonging to ADB member countries will be considered for admission as per criteria prescribed by ADB.

3.3.6 Visiting and professional candidate registration

These visiting students would be governed by the following rules and regulations :

a. A Visiting Student is a student registered for a degree in a recognized Institute/University in India or abroad who is officially sponsored by that Institute/University to carry out research or to avail himself laboratory or other academic facilities at IIT Delhi for a period not exceeding six months. In the case of a student who is not Indian National or Indian citizen, admission as a Visiting Student is subject to prior approval of the Govt. of India regarding his joining IIT Delhi.

b. Head of the Department/Centre may receive such official requests for the provision of Institute facilities and admit such a visiting student after due sanction from the Dean, PGS&R.

c. After Dean's approval, the sponsoring Institute concerned may be informed of this decision and the office given the necessary instructions for temporary registration of the student. The visiting students will be required to pay fees & deposit caution money as may be decided by the Board of Governors from time to time. (Rs.5,900/- for a full semester and Rs.2,000/- towards Security Deposit (refundable). In case registration is required for a shorter duration, it would be at the rate of Rs. 1,000/- p.m. The existing fee is under revision.

d. Self-financed foreign national registered as a Visiting Student will be required to pay US$ 2000 (US$ 1000 for students from SAARC countries). In case registration is required for a shorter duration, it would be at the rate of US$ 350 p.m. (US$ 175 p.m. for students from SAARC countries)

e. All visiting students attending courses must appear in all the tests as per the norms for regular students and also submit all class assignments. He/She will be required to go through the same rigor in the course as any regular student of IITD. Based on the performance he/she will be awarded certificate of satisfactory completion of the course with grade NP (Audit Pass) or NF (Audit Fail) as the case may be.

f. The student so admitted must be governed by the Institute rules and regulations as pertaining to regular Institute students of his/her academic level, with the exception that it should not be obligatory on the part of the student to reside in the Institute.

g. If a visiting student desires hostel and messing facilities of IIT Delhi, he/she must get written approval of the Dean of Students who will give necessary instructions for his/her admission to the hostel. In the event the student concerned resides in a hostel, he/she would be required to pay hostel accommodation charges and other hostel charges as applicable to Institute students of corresponding level.

h. The Research Fellows sponsored by CSIR and other such bodies are not to be regarded as visiting students. They should duly register with the Institute office and should be regarded as Institute scholars for all administrative and academic purposes.

i. The students coming to IIT Delhi to carry out research or to avail academic facilities at the Institute under the various agreements entered into with Universities/Institutions, will be considered as exchange students. In the event the provision with regard to the terms & conditions of such exchange students as laid down in the respective Memorandum of Understanding vary with the provisions in Institute Rules on 'provision of facilities to visiting students', the provisions in the Memorandum of Understanding will have over-riding effect.

These professional candidates would be governed by the following rules & regulations.

a. A professional candidate under this category is a candidate sponsored by his employer to register for one or more courses for his/her professional growth. He/she could be employed in industry, a Govt. Organisation, Research Laboratory etc.

b. Up to a maximum of 5 candidates sponsored by the employers be allowed to register for each course.

c. A sum of Rs. 5,000/- per credit be charged from personnel coming from Private & Public Industries and Rs. 2,000/- per credit from those coming from Government Organizations. In addition, they will be required to deposit a 'Security Deposit' of Rs.2, 000/-(refundable).

d. Visiting Professionals interested in registering for any course under the Professional candidate registration scheme should contact FITT, IIT Delhi, Hauz Khas, New Delhi-110016.

e. The Department in consultation with the Course Coordinator should look at the qualification (normally B.Tech./M.Sc./Equivalent in the relevant field) and background of the candidates before approving the request.

f. Admission of additional candidates on this account shall not count towards minimum number of students required for running a course.

g. Candidates should be issued Identity Card with distinct colour.

h. They shall be allowed to use Library facility for consultation purposes only.

i. All professional students attending courses must appear in all the tests as per the norms for regular students and also submit all class assignments. He/She will be required to go through the same rigor in the course as any regular student of IITD. Based on the performance he/she will be awarded certificate of satisfactory completion of the course with grade NP (Audit Pass) or NF (Audit Fail) as the case may be.

j. Candidates will be provided with all the facilities required for the Course work.

k. They shall not be registered for any major project.

l. They will not have any claim for accommodation on the Campus.

m. The Institute will not be liable for any damages on account of any injuries/loss sustained by such candidates during their Course Work at the Institute.

n. The relevant terms and conditions may be suitably incorporated in the offer of admission.

Table 10 Admission to Post Graduate Programme (See Notes for reservations/relaxation)

Degree	Status	Minimum Eligibility for Admission	Selection basis
M.Sc.	Full Time	At least 55% aggregate marks(taking into account all subjects including languages and subsidiaries, all years combined) for General category candidates and at least 50% aggregate marks (taking into account all subjects, including languages and subsidiaries, all years combined) for SC/ST and PD category candidates in the qualifying degree. For Candidates with letter grades/CGPA (instead of percentage of marks), the equivalence in percentage of marks will be 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 GATE≥ (a) 300 GATE score or qualifying score whichever is higher for general/OBC Category and (b) 200 GATE score or qualifying score whichever is higher for SC/ST/PD category. *B.Tech. from IITs with CGPA of 8.00 without GATE are also eligible for admission.AMIE/ Grad.IETE are eligible, subject to condition at Note 7.	GATE* and Written test and/ or interview
	Full Time Direct Admission	B.Tech./ M.Sc. or equivalent with (a) CGPA of 8.5 or 75% marks in aggregate for General/OBC Category, and CGPA of 7.5 or 70% marks in aggregate for SC/ST/PD category. GATE Score≥ 300 or qualifying score whichever is higher for General/OBC and 200 or qualifying score whichever is higher for SC/ST/PD.	GATE and interview if required
	Part Time Evening Programme	B.Tech./ M.Sc. or equivalent in relevant field with (a) CGPA 6.75 on a 10 point scale or 60% marks in aggregate for general Category and minimum 1 year experience as on 1 August, 2009. 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 part time or full time	Same as for M.Tech. part time requirements and Sponsoring Certificate from the employer as per Notes 4 and 5 respectively.	Written Test and/ or interview
M.Des.	Full Time	B.Tech./M.Sc. or equivalent in relevant field with CGPA 6.75 on 10 point scale or 60% marks in aggregate for general/OBC category and CEED score>(a) 75 percentile for general category/OBC, or (b) 50 percentile for SC/ST/PD category.	Written test and/ or interview
M.B.A.	Full Time	Becholar's degree in Engineering /Technology /Architecture/ Phamacy/ B.Sc. Agri.Engg. (Minimum 4 year after 10+2) or Master's degree in any branch of Physcical/ Chemical/ Mathematical Sciences like Physics/Chemistry/ Mathematics/Staistics/ 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.	JMET 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
M.S. (Research)	Full Time/Part Time/sponsored Full Time/ Part Time.	Same as the corresponding M.Tech. requirements.	same as the corresponding M.Tech. requirements
Ph.D.	Full Time	Master degree in Engineering/ Technology or master degree in Science/ Humanities or equivalent in relevant discipline with CGPA 6.75 on 10 point scale or 60% marks in aggregate for general/OBC category. Full time students who do not possess M.Tech. or equivalent degree are required to have a valid GATE Score (300 or qualifying score whichever is higher for GE/OBC & 200 or qualifying score whichever is higher for SC/ ST/PD) or UGC/CSIR/DBT/ICMR/INSPIRE fellowship examination for Sciences/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.	Written test and/ or interview
	Part Time	Same as for Ph.D. full time and minimum 2 years experience and No Objection Certificate from employer (as per Note 8.) No. GATE required vide Note.12.	Written test and/ or interview
	Sponsored Full Time or Part Time	Same as for Ph.D. full time and sponsoring Certificate from employers, as per Note 5 and 9. - No GATE/CEED required vide Note. 12.	-Do-
	Part Time Foreign National Posted in Delhi	Same as for full- time Subject to conditions stipulated in Note 13.	-Do-

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.
   (a) 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. Part-time M.Tech. classes are generally held from 8.00 a.m. to 10.00 a.m. For special 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.
7. Candidates with AMIE/grad. IETE fulfilling the minimum eligibility criteria can be considered for admission as casual 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 conversion table will be used to convert percentage of marks into GPA.

Equivalent GPA

% Marks	10-point Scale	9-point Scale	6-point Scale	4-point Scale
55	6.25	4.78	3.19	2.13
60	6.75	5.34	3.56	2.38
70	7.50	6.19	4.13	2.75

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

	1st semester	(%)	2nd semester	(%)
1st year	250/400	62.50	290/400	72.50
2nd year	205/400	51.25	280/400	70.00
3rd year	210/400	52.50	350/400	87.50
4th year	240/400	60.00	150/200	75.00
Total	**905/1600**		**1070/1400**	

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

12. Sponsored (Full-time) / Part-time candidates are not required to possess GATE/CEED score for admission to postgraduate/ Ph.D. programmes.
13. 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.

4. FEES

4.1 FEES PAYABLE BY STUDENTS OF THE ENTRY YEAR 2010

The fees payable by 2010 entry year students are given in Table 11.

4.2 SELF-FINANCING FOREIGN NATIONAL STUDENTS

Following are the fees per semester, chargeable from self-financing foreign national students including those seeking admission as visiting students :

2010-2011 i) US $ 1,000 and INR 7,735 for SAARC Countries

ii) US $ 2,000 and INR 7,735 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 Rs. 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.

4.6 WITHDRAWAL FROM THE INSTITUTE

If a student is continuously absent from the Institute for more than four weeks without informing the Dean, UG (for B.Tech., Dual-degree & 5-year Integrated M.Tech. students) and Head of the Deptt./ Dean, PGS&R (for PG and Ph.D. students), his/her name will be removed from the Institute rolls. Such absence during the first year will render the B.Tech., Dual-degree and 5-year Integrated M.Tech. student ineligible for re-admission.

A B.Tech., Dual-degree and 5-year Integrated M.Tech. student wishing to leave the Institute on his/her own should submit an application duly countersigned by his/her father/guardian. He/she shall also obtain "Clearance Certificate" from the Department, the Librarian, the Warden, the Officer Commanding, NCC, and the Accounts Section, and submit to the Academic Section (U.G.) for settling his/her accounts in the Accounts Section. The student shall remain liable to pay all dues till the date on which his/her name is formally struck off the Institute rolls.

A P.G. Student wishing to withdraw from the programme should submit his/her request to the Head of Deptt./ Centre on the prescribed form (available on the P.G. website) who will forward the same to Dean, PGS & R with his/her recommendations.

4.7 TRANSCRIPTS, DEGREE AND OTHER CERTIFICATES

Additional transcripts, duplicate degrees/diplomas, etc. can be obtained on payment of the following charges:

(a)	Degree, in person		:	Rs. 500
(b)	Degree, in absentia	(In India)	:	Rs. 750
		(In Abroad)	:	Rs. 1500
			or	US$ 150
(c)	Migration Certificate (Only one original)		:	Rs. 500
(d)	Duplicate Degree/certificate	(In India)	:	Rs. 2,500
	(Only one original)	(In Abroad)	:	US$ 250
(e)	Transcripts (1966 to 1991 entry years)	(In India)	:	Rs. 2,500
	(1 Original + 4 Attested Copies)	(In Abroad)	:	US$ 250
	Transcripts (1992 entry year onwards)	(In India)	:	Rs. 500
	(1 Original + 4 Attested Copies)	(In Abroad)	:	US$ 50
(f)	Duplicate Identity Card		:	Rs. 500
(g)	Certificate of medium of instruction in English	(In India)	:	Rs. 100
	(Only one original)	(In Abroad)	:	US$ 10
(h)	Verification of degree certificate,JEE rank, membership of Institute bodies, etc.(for each individual verification)	(In India)	:	Rs. 1,000
		(In Abroad)	:	US$ 100
(i)	Character certifacate (Only one original)	(In India)	:	Rs. 100
		(In Abroad)	:	US$ 10

Table 11 Details of Semester Fees - 2010 Entry Students (Payable in Indian currency unless otherwise noted)

	ITEM ↓ Student's programme ® →	B.Tech., Dual-degree Integ. M.Tech.	M.Sc.	M.Tech.,M.S. (R), M.Des. (Receiving Institute/Project assistantship or Teaching position holders)	M.Tech./M.S.(R)/ M.Des./DIIT (Sponsored, FT/PT & Non-Teaching position holders)	Ph.D.	M.B.A. Self-financing	Foreign students
1	**SEMESTER FEES (to be paid every semester)**							
1.1	**Institute Fees**							
	(i) Tuition fees ∗	25,000	2,500	5,000 #	25,000	2,500	25,000	**US$ 1000** for SAARC countries **US$ 2000** for other countries
	(ii) Examination fees	350	350	300	300	300	300	300
	(iii) Registration/Enrolment fees	200	200	300	300	300	300	300
	(iv) Gymkhana	100	100	100	100	100	100	100
	(v) Medical fees	50	50	50	50	50	50	50
	(vi) Internet and computer charges	500	500	500	500	500	500	500
	(vii) Transport charges (campus bus service)	35	35	35	35	35	35	35
1.2	**Hostel Fees ✚**							
(i)	Hostel seat rent	500	500	550	550	550	6000	550
(ii)	Fan, electricity and water charges	300	300	300	300	300	300	300
	Total (semester fees, to be paid every semester)	**27,035**	**4,535**	**7,135**	**27,135**	**4,635**	**32,585**	**2,135+US$ fee**
2	**ONE-TIME PAYMENTS (Non-refundable)** **To be paid at the time of admission**							
	(i) Admission fees	200	150	150	150	150	150	150
	(ii) Thesis fees	—-	—-	450 ♦	450 ♦	950	—-	950
	(iii) Grade card	200	150	150	150	—-	150	150
	(iv) Provisional certificate	200	100	100	100	100	100	100
	(v) Student welfare fund	300	200	200	200	200	200	200
	(vi) Modernization fees	400	300	500	500	500	500	500
	(vii) Identity card	100	—-	—-	—-	—-	—-	—-
	(viii) Benevolent fund	100	100	100	100	100	100	100
	(ix) Alumni fees	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	(x) Language Proficiency Testing Fees	500	—-	—-	—-	—-	—-	—-
	Total (one time payments at the time of admission)	**3,000**	**2,000**	**2,650**	**2,650**	**3,000**	**2,200**	**3,150**
3	**OTHER PAYMENTS**							
	(i) Insurance Scheme to be paid every year in 1st semester	450	450	450	450	450	450	450
	(ii) Training & Placement charges, to be paid in: 7th sem. by B.Tech.; 9th sem. by Dual-degree, Integ. M.Tech. 3rd sem. by M.Sc., M.B.A., M.Des., M.Tech. & M.S.(R)	500	500	500	500	—-	500	—-
4	**DEPOSITS (Refundable)**							
	(i) Institution security deposit	2,000	1,000	1,000	1,000	1,000	1,000	1,000
	(ii) Library security deposit	2,000	1,000	1,000	1,000	1,000	1,000	1,000
5	**Total fees payable at the time of admission**	***34,485***	***8,985***	***11,785***	***31,785***	***10,085***	***37,235***	***7,735+US$ fees***

NOTE: # The tuition fee in 9th and later semesters will be Rs. 5,000/- per semester for Dual-degree and Integrated M.Tech. programmes.

♦ Thesis Fees Paid only by M.S.(R) students. ✚Messing charges will be notified separately. ∗All SC and ST students will get 100 % tuition fee exemption.

5. SCHOLARSHIPS

5.1 UNDER GRADUATE PROGRAMMES

5.1.1 Institute merit-cum-means (MCM) scholarships

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

The 4-year B.Tech., 5-year Dual-degree and 5-year Integrated M.Tech. students are eligible to receive Merit-cum-Means scholarship at the time of joining the Institute. The criterion of merit for first year is All India Rank (AIR) in the JEE. The scholarships are renewed on a yearly basis until he/she clears all academic requirements of the programme, provided that he/she continues to satisfy the eligibility and continuation criteria.

For continuation of MCM, performance of the students will be reviewed at the end of each semester. The first such review will be held at the end of the second semester.

Continuation of MCM Scholarship : For general category students of the 4-year B.Tech; 5-year Dual-degree and 5-year Integrated M.Tech. programmes, the requirements of merit for continuation of Institute Merit-cum-Means Scholarship are:

(i) CGPA must be 6.0 or more; and

(ii) Earned credits should not be less than 22 times the number of semesters registered for; and

(iii) SGPA in the previous semester must be 6.0 or more.

On the criterion of means only those students are presently eligible whose parents have gross yearly income up to Rs. 4.5 lac per annum for all categories of students including SC/ST students. The terms and conditions of the award of scholarship are laid down in the rules and regulations thereof in force and are subject to change from time to time.

5.1.2 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., 5-year Dual-degree and 5-year Integrated M.Tech. programme each semester up to the 8th/10th semester. The value of merit prize is Rs.2500.

5.1.3 Institute free studentship U.G.

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

5.1.4 Scholarship provision for students of SC/ST category

(a) Tuition fee exemption is admissible to all SC/ST students irrespective of their parents'/guardians' income.

(b) Institute offers a scholarship of Rs. 300/- per month and exemption from paying room rent of the hostel, only to those SC/ST students whose parents'/guardians' income does not exceed the limit prescribed by the Government of India from time to time for award of Merit-cum-Means scholarship. The students can opt for free messing (basic menu) and Rs. 250/- per month as pocket allowance in lieu of the amount of the scholarship.

(c) All eligible SC/ST students while on training or doing courses during semester breaks or required to stay in the Institute during the semester breaks or exempted to take meals from the hostel due to medical reasons etc. may be given a payment of Rs. 70/- as pocket allowance (per month) and a per diem allowance in lieu of free messing on the basis of prevalent average rate of messing charges as applicable from time to time.

(d) Where an SC/ST candidate fails in the examination for the first time, the award may be renewed subject to a maximum limit of 5 years.

5.1.5 Assistantship for 5-year dual-degree and integrated M.Tech. programmes

The students of 5 year Dual-degree and 5-year Integrated M.Tech. programmes will be considered for award of Institute research/teaching assistantship when they begin their major project on completion of at least 165 credits. Only those students who have qualified in GATE/CEED or have CGPA of 8.0 or more will be eligible for this assistantship. However, for continuation of scholarship a student will have to secure SGPA of 7.0. In return, the student would render 8 hours of assistance per week besides his/her normal academic work.

Where the source of assistantship is other than the MHRD and Institute funds, the requirement of valid GATE score will be waived. However, the minimum CGPA required for grant of such assistantship will be 7.0.

5.1.6 Post-matric scholarship

The SC/ST students can opt for Post-Matric scholarship given to them by the State Government. The value of the scholarship is Rs. 280 per month for hostel residents and Rs. 125 per month for the day scholars. The recipient of this scholarship is paid other fees such as registration, tuition, games, union, library and other compulsory fees. The quantum of scholarship is related to the parents' income. The administration and renewal of this scholarship is based on the criterion as given in the Scheme of Post-Matric Scholarships to SC/ST students.

5.1.7 Central scholarship scheme for top class education of SC category students

This scholarship scheme has been formulated by the Ministry of Social Justice and Empowerment, Government of India to promote merit amongst the SC students for studies beyond 12th class. Ten seats are available at IIT Delhi. At the time of admission, SC students whose total family income from all sources does not exceed Rs. 2.00 lakh per annum are eligible. The scholarship will be awarded on the basis of merit as per AIR rank in the JEE.

The award covers the following:

(a) all fees and other non-refundable charges,

(b) boarding and lodging @ Rs. 2,220/- per month or actual whichever is less),

(c) books and stationery @ Rs. 3,000/- per annum or actual whichever is less, and

(d) provision of computer system (PC, printer, UPS, etc.) limited to Rs. 45,000/- once during the entire course of study.

5.1.8 Central scholarship scheme for top class education of scheduled tribes (STs) students

This scholarship scheme has been formulated by the Ministry of Tribal Affairs, Government of India to promote merit amongst the ST students for studies beyond 12th class. 5 seats are available at IIT Delhi. At the time of admission, ST students whose total family income from all sources does not exceed Rs. 2.00 lakh per annum are eligible. The scholarship will be awarded on the basis of merit as per AIR rank in the JEE.

The award covers the following:

(a) all fees and other non-refundable charges,

(b) boarding and lodging @ Rs. 2,200/- per month or actual whichever is less,

(c) books and stationery @ Rs. 3,000/- per annum or actual whichever is less, and

(d) provision of computer system (PC, printer, UPS) etc limited to Rs. 45,000/-, once during the entire course of study.

5.1.9 Scheme for IIT Delhi alumni sponsored "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. IIT Delhi does not itself provide loans, nor does IITD provide collateral securities, guarantee or surety. It has no obligation to the bank providing loans to students. However, upon specific request from students that seek loans, or have obtained loans, IITD that will provide information on their academic standing to banks. Salient features of the loan scholarships scheme are given below.

Eligibility:

1. The student must be a full time student at IIT Delhi.
2. Currently, the scheme is open to students in 4-year B.Tech., 5-year dual-degree (B.Tech. and M.Tech.), 5-Year Integrated M.Tech. programmes, and 2-year M.Sc. programmes. When more funds become available, the scheme may be opened to self-sponsored students in M.B.A., M.Tech., M.Des. or Ph.D.
3. A loan scholarship sponsored by an alumnus may be limited to a specific category of students, provided such preferential treatment is within the general policy of the Institute (handicapped, women, disadvantaged, etc.).
4. The student should have taken an educational loan under a scheme specifically approved by IIT Delhi for purpose of grant of "loan scholarship". Alternatively, the student will take an educational loan soon after the loan scholarship is awarded.
5. Normally, loan scholarships are offered to students soon after they are admitted to a programme in IIT. However, in those cases where a student has completed at least one semester, the student's GPA should satisfy the stipulated minimum for continuation of his/her studies.

Scholarship:

The loan scholarship is in the form of reimbursement of interest to a student. The amount reimbursed is the interest that accrues on the loan during the "nominal" duration of the programme. However, the amount reimbursed is subject to a limit determined and announced at the time the loan scholarship is awarded to the student.

List of Loan Scholarships

S.No.	Name of Scholarship	No. of Scholarships
1.	Deepak Gera Memorial Loan Scholarship	2
2.	Srimati Sarada Warrior Loan Scholarship	2
3.	Srimati Kamaladevi Yellepeddy Loan Scholarship	2
4	Srimati Sushma Lal Loan Scholarship	1
5.	Srimati Kameshwari Sahai Sexena Loan Scholarship	1
6.	Shri Motiram Bulchand Shivadasani Loan Scholarship	1
7.	Ved & Prem Lata Gulati Loan Scholarship	1
8.	Shrimati Dharam Devi Bhatia Loan Scholarship	1
9.	Shri Mantosh Sondhi Memorial Loan Scholarship	4
10	Shri Amit Garg Loan Scholarship	1
11.	Gauri Palriwala Memorial Loan Scholarship	3
12.	Batch of 1988 Loan Scholarship	1
13.	Samir Anand Loan Scholarship	1
14.	IITD Alumini Sponsored Corpus Loan Scholarship	10

5.1.10 Donor scholarships

There are several other scholarships in operation at the Institute. These scholarships have been made possible by grants from individuals, trusts and organizations, with a view to provide financial assistance to needy students. Announcements on these stating eligibility, value of scholarship, etc. are made from time to time. The adjoining table lists the donor scholarships currently available.

5.1.11 Board for student welfare schemes

The Board for Student Welfare provides for financial emergencies of students and can grant loans on short-term basis. It also has provision for grants-in-aid to deserving students.

5.1.12 Financial assistance from external sources

Several external organizations give scholarships and other awards. IIT Delhi facilitates the process for these awards. Announcements are publicized from time to time.

Other UG Scholarships Instituted by Outdside Organizations / Individuals

Name of the Scholarship	Amount	Criteria for award of the Scholarship
Suresh Chandra Memorial Trust Schorlarship	Rs. 300/- p.m.	One scholarship is awarded to a 1st year B.Tech. student purely on merit and based on the performance in the 1st semester whose parental income is less than Rs. 2.5 lakhs per annum. Renewal subject to maintain SGPA 6.00.
Mrs. Shanti Chopra Scholarship	Rs. 500/- p.m.	Two Merit-cum-Means scholarships are awarded to a 3rd year and a 4th year B.Tech. student of Electrical Engineering Department whose parental income is less than Rs. 2.5 lakhs per annum and CGPA is greater than 7.5 at the end of the preceding year. Renewable subject to maintain CGPA 7.5.
Taravati Ram Gopal Mehra Foundation Scholarship	Rs. 300/- p.m. + Tuition Fee	One scholarship is tenable to a 1st year UG student on the basis of JEE merit. Renewable for 4 years subject to maintain CGPA 6.00.
Ms. M. Ratna Benevolence Scholarship	Rs. 400/- p.m.	One scholarship to a first year B.Tech. student whose parental income is upto Rs. 2.5 lakhs per annum. Renewal for 4 years subject to maintain CGPA of 6.00.
Maj. Gen. Harkirat Singh Memorial Scholarship	Rs. 250/- p.m.	One scholarship is available to a final year student of Civil Engineering discipline as per merit, based on the results of pre-final year (2nd semester).
Lions Club, Delhi Scholarship	Rs. 100/- p.m.	One scholarship awarded on the basis of merit i.e., JEE rank for the duration of the programme. Renewal subject to maintain CGPA of 6.00.
Prof. A. K. Mahalanabis Memorial Scholarship	Rs. 400/- p.m.	One scholarship is awarded every year, to a 1st year UG student of Electrical Engineering who has the highest (AIR) in JEE. Renewable for 4 years subject to maintain GPA of 9.00. The student who enjoys the scholarship for 4 years will also be awarded A.K. Mahalanabis Memorial Medal.
Kundan Lal Trust Scholarship	Rs. 500/- p.m.	One scholarship is awarded to a 1st year student only for one year of any discipline on the basis of merit at the end of 1st semester.
Rajiv Bambawale Trust Scholarship	Rs. 700/- p.m.	One scholarship awarded every year to a 1st year UG student whose parental income is less than Rs. 2.5 lakhs per annum. Renewable subject to maintain CGPA of 6.00.
Kesar Devi Scholarships	Rs. 500/- p.m.	Two scholarships are awarded to 3rd year students of Mechanical Engineering with the highest CGPA at the end of 2nd year and parental income is less than Rs. 2.5 lakhs per annum. Renewable subject to maintain CGPA of 7.5.
Jawahar Gajree Memorial Scholarships	Rs. 500/- p.m.	Eight scholarships are awarded to 3rd year students and ten Scholarships to 4th year students on the basis of MCM whose parental income is less than Rs. 2.5 lakhs per annum. Renewable subject to maintain CGPA of 6.00.
Dogra Endowment Award (Scholarship)	Rs. 10,000/- p.a.	One Merit-cum-Means scholarship is awarded to 1st year student on the basis of MCM whose parental income is less than Rs. 2.5 lakhs per annum.
Lotus Development (U.K) Limited Scholarship	Rs. 2,200/- p.m.	Two scholarships are awarded to the 5th year students of 5-years intergrated M.Tech. in Mathematics and Computing with the minimum CGPA of 7.5 and earned credits 176 at the end of VIIIth semester and some innovative work in summer/mini/minor porjects. Renewable subject to maintain CGPA 7.5 and earned credits 202 at the end of IXth semester.
Silicon Graphics Systems (India) Ltd. Scholarships	Rs. 2,200/- p.m.	Three scholarships for the 5th year students of 5-year intergrated M.Tech. in Mathematics and Computing with the minimum CGPA of 7.5 and earned credits 176 at the end of VIIIth semester and some innovative work in summer/mini/minor projects. Renewable subject to maintain CGPA 7.5 and earned credits 202 at the end of IXth semester.

Oracle Software India Ltd. Scholarships	Rs. 2,200/- p.m.	Three scholarships to the 5th year students of 5-year Integrated M.Tech. in Mathematics and Computing with the minimum CGPA of 7.5 and earned credits 176 at the end VIIIth semester and some innovative work in summer/mini/minor projects. Renewable subject to maintain CGPA 7.5 and earned credits 202 the end of IXth semester.
Hira Devi Jain Scholarship	Tuition fee waive	One freeship is granted to a 1st year UG student on the basis of MCM and perference will be given to the student who is supported by mother's income only (parental income upto Rs. 2.5 lakhs per annum).
Pranab K. Chatterjee Family Scholarship	Rs. 1,500/- p.m.	One fellowship is granted to a 2nd year UG student of Chemical Engineering Department having CGPA of 6.75 and parental income upto Rs. 2.5 lakhs per annum. Renewable subject to maintain CGPA 6.75.
Elnova Ltd. Scholarship	Rs. 5,000/- per semester	One Scholarship is awarded to a final year student who is working on the project in the field of "Power Electronics". Parental Income upto Rs.2.5 lakhs per annum.
Daulat Ram Mendiratta Scholarship	Rs. 10,000/- p.a.	One Merit-cum-Means scholarship is awarded to a 1st year UG student of Civil Engg. on the basis of JEE merit. Renewable for 4 years subject to maintain CGPA 6.00.
Indian Women's Association Bonn Scholarship	Rs. 1,800/- p.m. (for 9 months)	One Scholarship is awarded to a 1st year UG student on the basis of MCM.(Parental income upto Rs.2.5 lakhs per annum). Renewable for 4 years, subject to maintain CGPA 7.00 and earned credits 45 every year.
B. S. Hajela Memorial Scholarships	Rs. 2,000/- p.m. (for 10 months)	Two scholarships are awarded to a 1st year UG students on the basis of MCM (Parental income upto Rs.2.5 lakhs per annum). Renewable subject to earn at least 22 credits every semester and maintain CGPA 7.5
Rai Saheb Raghunath Das and Smt. Sushma Gupta Trust Scholarship	Rs. 1,500/- p.m. (for 10 months)	One scholarship is awarded to a 1st year UG student based on JEE in General Category and who is not supported by father and is dependent solely on the mother for his/her education. The income of the mother upto Rs.2.5 lakhs per annum. Renewable subject to earn 22 credits and maintain CGPA 7.5 and is not awarded fail grade in any course.
Tara Chand Chopra Scholarship	Rs. 1,500/- p.m. (for 10 months)	One scholarship is awarded to a 1st year UG student on the MCM basis and whose parental income upto Rs. 2.5 lakhs per annum. Renewable subject to earn 22 credits and maintain CGPA 7.5 and is not awarded fail grade in any course.
Gyan Scholarship	Rs. 1,500/- p.m. (for 10 months)	One scholarship is awarded to a 1st year UG student on the MCM basis and whose parental income upto Rs. 2.5 lakhs per annum. Renewable subject to earn 22 credits and maintain CGPA 7.5 and is not awarded fail grade in any course.
Major Dr. Nityananda Tyagi Scholarship	Rs. 1,500/- p.m. (for 10 months)	One scholarship is awarded to a 1st year UG student whose parental income upto Rs. 2.5 lakhs per annum. Renewable subject to earn 22 credits and maintain CGPA 7.5 and is not awarded fail grade in any course.
Meera Mehta Scholarship	Rs. 1,500/- p.m. (for 10 months)	One scholarship is awarded to a 1st year UG student whose parental income is upto Rs. 2.5 lakhs per annum. Renewable subject to earn 22 credits and maintain CGPA 7.5 and is not awarded fail grade in any course.
Vivekanand Scholarship	Rs. 1,500/- p.m. (for 10 months)	One fellowship is awarded to a 1st year UG student of whose parental income is upto Rs. 2.5 lakhs per annum. Renewable subject to earn 22 credits and maintain CGPA 7.5 and is not awarded fail grade in any course.

Veena Bhatia Mendiratta Freeship	Tuition Fee	One freeship is granted to a 1st year meritorious UG student on merit base. (Parental income upto Rs. 2.5 lakhs per annum).
Jaman Lal Bhatia Freeship	Tuition Fee	One freeship is granted to a 1st year meritorious UG student on merit base. (Parental income upto Rs. 2.5 lakhs per annum).
Pramila Moudgil Freeship	Rs. 1,500/- p.m. (for 10 months)	One freeship is awarded to a 1st year UG student on the basis of of MCM (Parental income upto Rs. 2.5 lakhs per annum). Renewable subject to earn 22 credits and maintain CGPA 7.5.
Dhan Kaur Memorial Scholarship	Rs. 1,250/- p.m.	Two scholarships are awarded for 1st year UG student from the beginning of 1st semester based on MCM (parental income upto Rs. 2.5 lakhs per annum). One in Computer Science & Engg. and one in Electrical Engg. Dept. (Preference will be given to the sudents with widow mother). Renewable subject to maintain CGPA 7.5.
Nirmal Prasad Jain Scholarship	Rs. 1,250/- p.m. (for 10 months)	One Scholarship is awarded to a 1st year undergraduate student on the basis of MCM (parental income upto Rs. 2.5 lakhs per annum). Renewable subject to earn 22 credits and maintain CGPA 7.5 and is not awarded Fail grade in any course.
Singal Scholarship	Rs. 6,500/- per semester	One Scholarship is awarded to a 1st year female student of Electrical or Mechanical Engg. on the basis of merit (parental income upto Rs. 2.5 lakhs per annum). Renewable subject to earn 22 credits and maintain CGPA 7.5 and is not awareded Fail grade in any course.
Lakshmi Devi Scholarship	Tuition Fee	One scholarship is awarded to a 1st year student on the basis of merit (parental income upto Rs. 2.5 lakhs per annum). Preference will be given to the girl students. Renewable subject to satisfactory performance in the previous year.
Krishna Engineering Scholarship	Rs. 1,200/- p.m. (for 10 months)	One scholarship is awarded to a 1st year UG student of Civil Engineering on the basis of merit (parental income upto Rs. 2.5 lakhs per annum). Renewable subject to earn 22 credits and maintain CGPA 7.5 and is not awarded Fail grade in any course.
Vidyavati Mehndiratta	Rs.1,500/- p.m. (for 10 months)	One scholarship is awarded to a female UG student on the basis of merit (parental income upto Rs.2.5 lakhs per annum). Renewable subject to earn 22 credits and maintain CGPA 7.5 and is not awarded Fail grade in any course.
Anandpuri Scholarship	Rs.1,000/- p.m. (for 10 months)	One scholarship is awarded to a 1st year UG student on the basis of merit (parental income upto Rs. 2.5 lakhs per annum). Renewable suject to earn 22 credits and maintain CGPA 7.5 and is not awarded Fail grade in any course.
Inlaks Foundation Merit Scholarship	Rs.27,500 per Semester	Three Scholarship are awarded every year to three students one each from 2nd 3rd and 4th year who obtain a CGPA of 9.0 or more. The award will be given after ascertaining the student's performance in academics as well as extra curricular activities. Renewable subject to maintain CGPA 8.5.
Kalpana Chawla Scholarship	Rs.35,000 (to final year student) 25,000 (pre final year student) per annum	Two scholarships are awarded to the pre-final and final year student having CGPA of 8.00 or above.The student is required to submit a write up highlighting his/her creativeness & scientific contribution. His/her interest and drive towards excellence and the scholastic aptitude shall be the prime criteria.

Mudit Sharma Schorlarship	Rs.1,000/- p.m.	One scholarship is awarded to a 2nd year B.Tech. Engineering Physics student who has highest CGPA at the end of 1st year and continues in the Engineering Physics programme in the 2nd year.
Aditya Birla Group Schorlarship	Rs.65,000/- p.a.	The schorlarships are awarded to meet the tuition and hostel fee expenditure. The awardees are decided by the Aditya Birla Group based on nominations from IIT Delhi.
Jagdishwar & Maya Jaluria Scholarship	Rs.2,400/- p.m. (for 10 months)	One scholarship is awarded to a 2nd year Mech. Engg. student on the basis of merit. Renewable subject to maintain CGPA 7.5.
Shri B.N. & Smt. Kamlesh Sharma	Rs.1,250/- p.m. (for 10 months)	One scholarship is awarded to a 3rd year student from Chemical Engg. securing minimum CGPA of 6.5 and having a track record of extra curricular activities.
Jwala Batch of 1984 Scholarship	Rs.1,250/- p.m. (for 10 months)	One scholarship is awarded to a 3rd year student from Jwalamukhi Hostel on the basis of MCM. The student shall not be recipient of any other scholarship.
CS&E 1998 Batch Scholarship	Rs.1,250/- p.m. (for 10 months)	One scholarship is awarded to a 2nd year student from Computer Science & Engg on the basis of MCM. The student shall not be recipient of any other scholarship.
Upma Memorial Scholarship	Rs. 1,000/- p.m. (for 12 months)	One merit-cum-means scholarship to a 1st year student for a period of IInd and IIIrd semester of Undergraduate programme (B.Tech., Dual-degree and Integrated M.Tech Programmes).The Scholarship will be warded to an eligible student who should have a minimum CGPA of 6.00 at the end of the first semester without any fail grade. Family income upto Rs.4.5 lacs.
Rupa Moudgill Scholarship	Rs. 1,000/- p.m. (for 10 months)	One merit-cum-means scholarship to a 1st year UG student. Renewable subject to earned 20 credits and CGPA 7.5.
ABB Scholarship	Rs.24,000/- p.a.	One scholarship is awarded to a 2nd year student in the discipline of Electrical Engineering (Power) on the basis of merit and aptitude to pursue studies/projects in subjects of relevance to ABB. Renewable subject to earn 22 credits and maintain CGPA 7.5 and is not awarded Fail grade in any course.
Nilgiri 1990 Batch Scholarship	Rs.1600/- p.m. (for 10 months)	One scholarship is awarded to a UG student of Nilgiri Hostel (completed Ist year or 2nd year, including the summer semester) for a period of one year with a minimum CGPA of 6.0. No weightage will be given for higher CGPA. The awardee will be decided taking into account iinvolvement in extra curricular, hostel and academic activities. Due consideration will be given to special projects undertaken. The student receiving any other scholarship will not be eligible for Nilgiri 1990 Batch Scholarship.
Amritraj Chibber Family Scholarship	Rs.1,500/- p.m. (for 10 months)	One scholarship is awarded to a 2nd year UG Chemical Engg. student minimum CGPA of 7.0. The student with the lowest means and is not a recipient of any other scholarship.Renewable subject to maintain CGPA 7.0.
Nirmala Devi Raghunath Das Sarin Scholarship	Rs.1,500/- p.m. (for 10 months)	One scholarship is awarded to a 2nd year UG Textile Technology on the basis of MCM having CGPA 6.0 or more. The student with the lowest means and is not a recipient of any other scholarship.
Best Sportsperson Scholarship	Rs.1500 p.m. (for 10 months)	One scholarship is awarded to UG/PG regular students of those disiciplines in which Inter IIT tournaments are conducted. Student with minimum CGPA of 6.00 are eligible. 1st year students, and the students against whom disciplinary action has been taken at any level will not be considered for the scholarship. The scholarship will be for one calendar year.
Buti Foundation Scholarship	Tuition Fee waiver	One scholarship is awarded to 1st year UG students on the basis of merit and parental income upto Rs. 3.0 lakhs. Renewable for 4 years subject to maintain CGPA 8.0.

Mehra Chand Motia Devi Kohli Scholarship	Rs.2000/- p.m. (for 10 months)	One scholarship is awarded to first year B.Tech. student based on JEE score and Merit-cum-Means. Parents income upto Rs.3 Lakhs. The scholarship will be awarded for the entire period of programme provided he/she maintain CGPA of 7.5.
Jain Scholarship	Rs.1500/- p.m. (for 10 months)	Two scholarship on merit-cum-means basis to 1st year B.Tech. student based on his/her JEE score & family income not exceeding Rs. 3 lacs. Scholarship will be awarded for the entire period of programme provided maintain CGPA of 7.5. In case the awardee fails to maintain minimum CGPA, the scholarship will be awarded to another 1st year student.
ST Engineering of **Scholarship**	Semester fees, campus accommodation	The scholarship will be offered to 2nd year full-time undergraduates B.Tech. programme (Code ME1), who have completed first year of studies in IITD. The scholarship will be continued for the 3rd year (Food inclusive), and 4th year if the scholar continues to satisfy the continuation book allowances criteria. Criteria to be used for selection are: 1. Good character and conduct, law-abiding and passionate towards the society. 2. Excellent academic results i.e top 10% of ME1. 3. Demonstrated strong organizational skills and leadership qualities. 4. Innovative and competitive spirit.
S.C.Mehrotra's Scholarship	Rs.1500/- per month	Every year a merit-cum-means scholarship to a second year student in Civil Engineering deptt. for the next semester to UG programme. 1. In the first year (for 2nd year student) 2. In the Second year (for 2nd and 3rd year) 3. In the subsequent year (for 2nd, 3rd and 4th year) Only those students who obtain a CGPA of 7.0 or more at the end of the 1st year.
Budhwanti Mrig Memorial Educational Scholarships	Rs.25000/- per semester	Every year two first year girl students (B.Tech., Dual Degree Integrated M.Tech. Programmes). Parents income not exceed Rs. 5.00 lacs. The scholarship continue for the first eight registered semester of the study with minimum SGPA 7.0 in the previous semester. Students availing tuition fee wavier/tuition fee support from any other sources shall not be eligible for this scholarship.
IITD Alumni Association Scholarship	Rs. 2000/- per month for 12 months end	One merit -cum-means scholarship every year to a second year undergraduate student (B.Tech., Dual Degree Integrated M.Tech.Programmes) should have a minimum CGPA 7.5 at the of first year. Family income not exceed Rs.5 lacs per annum.
Gurdayal Arora Scholarship	Rs.1500 per month for ten months	To 1st year undergraduate student of any discipline on MCM basis with parents income upto 2.5 lacs.
Shanti Devi Arora Scholarship	Rs. 1500/- per month for ten months	To 1st year undergraduate student of any discipline on MCM basis with parents income upto 2.5 lacs.
Vijay Arora Scholarship	Rs. 1500/- per month for ten months	To 1st year undergradute student of any discipline on MCM basis with parents income upto 2.5 lacs.
Gobind H. Keswani Scholarship	Rs. 25,000/- per semester	One merit cum means scholarship to a first year student of UG programme admitted through IIT JEE having family income not exceeding Rs. 5 Lacs.

5.2 POSTGRADUATE PROGRAMMES

5.2.1 M.Sc. programmes

Merit-cum-means scholarship of Rs.1000/- per month and free tuition are permissible to M.Sc. students to the extent of 25% of the sanctioned strength subject to a maximum of ten in each department as per Institute rules. Only those students are eligible whose parents' gross income is less than Rs. 4.5 lac per annum for all categories of students, including SC/ST students. The terms and conditions of the award of scholarship including conditions for continuation are laid down in the *Rules and Regulations* and are subject to change from time to time. Apart from above, the following scholarships Instituted by outside organisations/individuals are also available for M.Sc. students:

(a) National Board of Higher Mathematics Scholarship in the Deptt. of Mathematics

Two scholarships of Rs. 400 per month plus a yearly book grant of Rs. 1,000/- are offered by the National Board of Higher Mathematics to students of M.Sc. in Mathematics on selection by the National Board of Higher Mathematics.

(b) Prof. Prem Kumar Merit Scholarship in the Deptt. of Mathematics

Two Scholarships, each of the value of Rs. 10,000/- p.a., will be given every year, one for M.Sc. (Maths) Ist year and the other for M.Sc. (Maths) 2nd year student based on Merit-cum-Means. The annual income of parents/guardians should be less than 2.00 lakhs after standard deduction.

(c) Dr. R.S. Narayanan Memorial Scholarship in the Deptt. of Physics

Four Merit-cum-Means Scholarships, each of the value of Rs.300/- p.m. will be given to the meritorous M.Sc. (Physics) students of each year.

(d) Prof. Vidhya Bhushan Anand Memorial Scholarship in the Deptt. of Physics

A scholarship of Rs. 1500/- per month will be given to an M.Sc. (Physics) final year student who secures the highest CGPA (minimum 8.0) at the end of the 1st year.

(e) Madan Lal Palriwala Memorial Loan Scholarship

This Loan scholarship is available for 3 Full-Time M.Sc. Student (one each in Chemistry, Mathematics and Physics) at 1st year level, and continues till the successful completion of the programme.

(f) Mr. Biman Behari Sen Memorial Scholarship

A Scholarship of Rs.1500 p.m. will be given for a duration of 10 months to the best student in M.Sc. (Final) Physics Deptt. securing highest CGPA.

(g) Amar Chand Memorial Scholarship

Two merit scholarships of Rs.400/- p.m. each are awarded to a first year and a second year student of M.Sc. (Maths.) for Ten Months. For continuation of the scholarship, the awardee shall maintain a minimum CGPA of 6.75 at the end of first year.

(h) Suman Gupta Memorial Scholarship

Scholarship of Rs.1,000/- p.m. is awarded to a student of Ist year M.Sc. Mathematics for a period of 10 months in academic session on the basis of Merit-cum-Means.

(i) Asha Devi Ram Kishore Jaiswal Scholarship

Scholarship of Rs.1,500/- p.m. is awarded to a student of 2nd year M.Sc.Physics for a period of 10 months in academic session on the basis of Highest CGPA in 1st year.

5.2.2 Scheme for financial assistance : M.Tech., M.S.(Research), M.Des., and Ph.D. students

The Institute does not award any scholarship to the students of M.Tech., M.S. (Research), M.Des. and Ph.D. programmes. However, a scheme for financial assistance is in operation. The sponsored (full-time as well as part-time), self-financing foreign national students and part-time students of these programmes are, however, not eligible for the benefit of this scheme.

Apart from the teaching/research assistantships, there are a number of fellowships and scholarships Instituted by industries and individuals :

(a) PETROTECH Fellowship

A fellowship of Rs. 11000 per month plus tuition fee and Rs. 20000 per year as contingency grant for one student for a Ph.D. programme in the Department of Chemistry carrying out research in the areas of innovative technologies in the field of petroleum and related products and process are given from contribution by PETROTECH Society.

(b) Sumant Moolgaokar Research Grant

A maximum grant of Rs.42000 per year to postgraduate/ research scholar student working in the area of sustainable Transportation Research is given from contribution by TELCO.

(c) Volvo Foundation Research Scholarships

A maximum grant of Rs. 70,000 per year to each of four postgraduate/ research scholars working in the area of Transportation with special reference to sustainability, safety and environmental protection is given from TRIPP project "Sustainable Urban Transport, Research & Education".

(d) Honeywell Fellowships

One fellowship of Rs. 7000 per month plus tuition fee and a contingency grant of Rs. 10,000 per annum to an M.Tech. student in Chemical Engineering/ CPSE; and one fellowship of Rs. 12000 per month in 1st & 2nd year and Rs. 15000 per month for a maximum of 3 more years thereafter plus tuition fee and a contingency grant of Rs. 25000 per annum to a Ph.D. fellow in Chemistry Department are given from contribution by Honewell International India Pvt. Ltd.

(e) ABB Scholarship

One scholarship of Rs. 1,20,000 per year to a postgraduate student in the first year in the discipline of PS/ PEEMD in alternate years is given from contribution by ABB India.

(f) Bharti Merit Award/ Fellowship

Awards/ Fellowships of Rs. 20,000, 15,000 and 10,000 each to top three (rank I, II & III respectively) students each of M.Tech. (Telecom Technology and Management) and MBA (with focus on Telecom Systems Management) programmes being run in the Bharti School are given from contribution by Bharti Enterprises. In addition, the top three students of MBA are also eligible to receive a fellowship of Rs. 3000, Rs. 1500 & Rs. 1000 having rank I, II & III respectively for the next 10 months subject to fulfilling a minimum CGPA criteria.

It should be noted that admission to programmes and award of assistantship are not linked. Admission to any programme does not guarantee the award of assistantship. Those who are not awarded Assistantship can continue with the programme as self-financing students.

The financial assistance is awarded as under :

M.Tech., M.S. (Research) and M.Des. Students

A scheme for the award of Teaching/Research Assistantships for providing financial assistance to the students of M.Tech./M.S. (Research) /M.Des. programmes exists. In term of this scheme, students admitted to M.Tech./M.S. (Research)/M.Des. programmes on full-time basis are considered for the award of 'Half-time' research/teaching assistantship of Rs. 8,000/- per month. The maximum duration for which Assistantship can be awarded to M.Tech. and M.Des. students is 4 semesters. Assistantship for M.S. (Research) programme is made up to the 4th semester (against M.Tech./Ph.D. slots). In return, the student renders 8 hours per week of assistance outside his normal academic work and as assigned by the Head of the Department/ Centre/ or the interdisciplinary Programme Coordinators. Only full-time (other than sponsored students) who have qualified GATE/CEED are eligible for Assistantship. Continuation of the Assistantship is contingent on satisfactory academic performance, satisfactory performance in the discharge of responsibilities assigned under the scheme, and the minimum prescribed attendance requirement. Assistantship of students whose SGPA at the end of a semester falls below 7.00 (6.75 in the case of SC/ST/PH) is not renewed for the subsequent semester.

A large number of DAAD scholarships are also available. Indian students pursuing M.Tech. or M.S.(Research) at IIT Delhi are eligible for this scholarship for doing their thesis work for about nine months at seven German Universities.

The Department of Atomic Energy has also agreed to provide upto a maximum of 20 placement based fellowships for M.Tech. students of IIT Delhi from academic year 2002-2003.

PG Students who are B.Tech. Graduates from IITs, getting a CGPA of 8.000 or above (on a 10-Ponit Scale) and are admitted to the PG Programmes without GATE Score will be awarded Institute Assistantship.

ABB Scholarship: To a M.Tech. Student in the First year in the discipline of PS/PEEMD in alternate years. The value of the scholarship will be 1,20,000/- per year.

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. In terms of this scheme, those students who are admitted on full-time basis will be considered, on request, for the award of Teaching/Research Assistantship. They are required to render 8 hours of teaching/research assistance to the Department/Centre outside their normal academic work.

The salient features of the assistantship scheme for Ph.D. students are summarized below:

	Amount of Assistantship		Number of hours of assistance per week to be provided by the student to the Institute
	With B.Tech./B.E./M.Sc.or equivalent qualifications	With M.Tech./M.E./MBBS or equivalent qualification	
First two years of Regn.	Rs. 12,000 p.m.	Rs. 14,000 p.m.	8
Next 2 years of Regn.	Rs.14,000 p.m.	Rs.15,000 p.m.	

The maximum duration for which assistantship can be awarded to any Ph.D. student is 4 years. Continuation of the Assistantship is contingent on satisfactory academic performance, a minimum of 7.00 SGPA in course work each semester when course work is taken, satisfactory performance in the discharge of responsibilities assigned under the scheme and minimum prescribed attendance requirement. Ph.D. students getting assistantship are also eligible for contingent grant as per the rules/norms of the Institute.

Full-time students who do not possess an M.Tech. or equivalent degree are required to have a valid GATE/CEED score in order to become eligible for Institute assistantship.

For assistantship purposes, candidates with M.B.B.S. qualification will be considered equivalent to M.Tech. Candidates with MD/MS degree will be eligible for Research/Teaching Assistantship of Rs.15,000/- p.m.

The faculty of Engineering/Science colleges may be considered for the award of Institute Assistantship for pursuing Ph.D. programme at IIT Delhi, subject to the following terms and conditions:

(a) The concerned faculty member of the Engineering/Science college must be sponsored by their respective Institutions to pursue the Ph.D. programme at IIT Delhi.

(b) The sponsored faculty of Engineering/Science Colleges must be eligible for Institute Assistantship i.e., he/she should either hold an M.Tech. degree or valid GATE score or CSIR/UGC NET.

(c) The Assistantship should be within the sanctioned limit of a particular Department/Centre.

(d) The DRC/CRC should examine each case on merit before making recommendations to the Dean, PGS&R for award of Institute Assistantship.

(e) On admission to the Ph.D. programme they will be entitled to Assistantship, as applicable to other regular Institute scholars irrespective of the quantum of salary they get from their Colleges/Institutes.

The faculty of Engineering/Science Colleges admitted to Ph.D. programme, who are eligible for Institute Assistantship as per the above norms may also be considered for the award of Industry Fellowship if they are sponsored/granted leave without pay.

Apart from the above mentioned schemes for teaching/research assistantships, there are a number of fellowships/ Scholarships Instituted by Industries/Individuals. (For more information on these scholarships/ assistantships/ fellowships please contact the respective department).

6. MEDALS AND PRIZES

The following medals and prizes are awarded to the students on the basis of examination/project and all-round performance in sports, co-curricular activities, etc. in the manner given below:

6.1 UNDERGRADUATE PROGRAMMES

Name of the Medal/Prize	Criteria for award
President's Gold Medal	To a candidate who obtains the highest CGPA among all students obtaining a B.Tech. degree in that year from the 4-year B.Tech. and 5-year Dual-degree programmes. For the purpose of this award, the CGPA for the 4-year programme students will be computed without including the Major Project grades, while those for the dual-degree students, it will be based on the UG credits. In case there is a tie, the medal is awarded to the student with the largest earned credits.
Director's Gold Medal	To a candidate who is adjudged as the best all-rounder from amongst the graduating students of the 4-year B.Tech., 5-year Integrated M.Tech. and 5-year Dual-degree programmes.
Institute Gold Medal	To a candidate securing a CGPA of 10, other than the one who has been awarded the President's Gold Medal.
Institute Silver Medal (for each programme)	To a candidate (one in each programme) who obtains the highest CGPA among and undergraduate graduating class of the Institute in his/her programme. A separate (additional) Institute Silver Medal, for each Dual-degree programme, will be awarded to a candidate in each Dual-degree programme who obtains the highest CGPA amongst the graduating students of that programme. For the purpose of this award, the CGPA will be calculated on the basis of the cumulative performance in both B.Tech. and M.Tech. credits. In case there is a tie, the medal is awarded to the student with the largest earned credits. No Silver Medal will be awarded in the discipline from which a student gets the President's Gold Medal & Institute Gold Medal. A minimum CGPA of 8.5 is required for award of Institute Silver Medal; in case no graduating student satisfies this criterion, the student with the highest CGPA is given a certificate.
Perfect Ten Gold Medal	To a graduating student of dual-degree programme who has secured a CGPA of 10 in the M.Tech. part of the programme.
Rajindra Kumari Malhotra Memorial Prize	Instituted for encouraging responsible student leadership based on student's performance in curricular and co-curricular activities during the previous year. It carries one prize of Rs. 1,000/- and is awarded to a student who shows best responsible student leadership among II, III and IV year students on the basis of academic requirement and participation in extra-cocurricular activities.
Alumni Association, IIT Delhi Prize	Instituted to provide incentive for the average student to improve his academic performance. The prize is awarded to the top scorer from amongst the II, III and IV year students at the end of 2nd semester taking into account the results of 1st and 2nd semesters. It carries a prize money of Rs. 10,000/-.
Raman Subramanian Award	To a student for the highest Grade Point Average at the end of the II year. It carries a prize money of Rs. 225/-.
Rajiv Bambawale Cash Prize	To be a student for the best project work of the year among final year B.Tech. students of Electrical Engineering. It carries a prize money of Rs. 1,000/-.
Mr. & Mrs. Prem Sheel Bhatnagar Award	To a student for the best project work of the year among final year B.Tech. students of Civil Engineering. It carries prize money of Rs. 1,000/-.
Rajiv Bambawale Cash Award	To a final year student having best cumulative performance up to the pre-final level. The value of the award is Rs. 2,500/-.

R. Vibhakar Memorial Commemorative Medal and Cash Prize	To the student of III year of any discipline securing the highest CGPA.The value of the award is Rs. 250/-.
Harsha Vardhan Dwarkadas Motiwala Memorial Prize	To the best final year B.Tech. student of Textile Technology discipline. It carries a prize money of Rs. 1500/-.
Vivek Sharma Memorial Award	To the best outgoing sportsman. It carries a prize money of Rs. 1,000/-.
TCS Project Award	To students for the best B.Tech. project in the final year, one each in the Departments of Computer Science & Engineering and Mechanical Engineering. It carries a prize money of Rs. 5,000/- each.
K. Vasudevan Award	To be awarded to the students securing the highest CGPA at the end of the I, II, III and IV year in the Textile Technology discipline. It carries a prize money of Rs.1,000/- each.
Prof. A. K. Mahalanabis Memorial Medal	To the recipient of the "A. K. Mahalanabis Memorial Scholarship" in recognition of his sustained academic excellence at the Institute.
Alok Saxena Memorial Award	To the second best all-rounder amongst the undergraduate graduating students. It carries a prize money of Rs. 1,000/-.
Suresh Chandra Memorial Trust Award for Best Software Project	Two awards each of the value of Rs. 2,000/- for Best Software Project for B.Tech., one each in Departments of Computer Science & Engg. and Mechanical Engineering.
Mehta Tarlok Chand Mohan Memorial Award	To a III year Civil Engineering student having highest CGPA. The value of the award is Rs. 1,000/-.
Padmashri Man Mohan Suri Project Award	For the best innovative hardware oriented B.Tech. Major Project in Mechanical Engineering discipline. The value of the award is Rs. 2,500/-.
Kehar Singh Memorial Award	An award of the value of Rs. 1,000/- to a B.Tech. student of Civil Engineering for the best performance at the end of the fourth semester considering CGPA and earned credits.
ICIM Stay Ahead Award	To a IV year student falling in the first 10 ranks of his discipline, whose project in Computer Technology, Information Technology, CAD/CAM, Robotics and Automation has been selected by the Committee. It carries a prize money of Rs. 6,000/-.
Dogra Medal	For best all-rounder from amongst the graduating UG students of Civil Engineering discipline.
Shri Shashank Vikram Garg Award	To the best all-rounder B.Tech./Integrated M.Tech./M.C.A. having completed third year. The merit will be adjudged in both academic and non-academic performance evaluated after the completion of 5th semester every year. It carries the award money of Rs. 10,000/-.
WAPCOS Silver Jubilee Award	To a B.Tech. student at the end of 3rd year for his best performance in Hydrology and Water Resources Engineering courses. It carries the prize money of Rs. 2,000/-.
Motorola Student of the Year Award	For the best UG all-rounder from amongst the Graduating UG student of Electrical Engineering.
River Run Software Group B.Tech. Project Fellowship	To a B.Tech. project in Computer Science & Engg. Department Rs. 5,000/- will be paid to and shared by the students working on the project over a period of October to April, of next year. The remaining Rs. 5,000/- will be used to procure software, equipment, books etc. Support is renewable on yearly basis.

Bimla Jain Medal	Gold Medal to UG girl student with the best achievement at UG level. The minimum eligibility is CGPA of 8.5 at the end of 7th semester.
Shri & Smt. B.S. Nayyar Memorial Award for Excellence	Two medals, one to UG girl and one to UG boy students. The minimum CGPA of 8.5 and above at the end of 6th semester. The student also made visible contribution toward extra curricular activities including number of Projects done over and above.
Ujjal Jeewan Charitable Trust Award	Medal to the best all round M.Tech. Student in the Deptt. of Bio-chemical Engineering & Bio-Technology.
Laxmi Bai - Lal Chand Khurana Memorial Award	To the best graduating student of 5 year M.Tech. in Mathematics and Computing with highest CGPA. In the event of a tie a Committee will resolve the tie Keeping in view the relevant details of the eligible students. The Prize money is Rs. 5000/-.
Pyare Lal Murgai Award	The award will be given to an UG student with highest SGPA/CGPA based on the result of the 1st semester on Merit-cum-Means basis in the discipline of Computer Science & Engineering as a first preference, if not possible the student with the same criteria in the discipline of Chemical Engg. will be given the award of Rs.1,000/-.
Rahul Giri Memorial Medal	The award of the medal will be given annually amongst the best all-rounder from the graduating students of the department of Computer Science or Electrical Engineering.
Boss Award	8 Awards are to be given annually to undergraduate student or group of student who are entitled to receive a B.Tech. Degree from IITD (including those from Dual-degree Programme) and whose projects are selected as the best hardcore experimental projects. The value of the award is Rs. 10,000/- to each student.
B.N. Bhardwaj Memorial Award	Two awards, one each from IInd and IIIrd year UG Student. Means-cum-merit will be criterion for selection. Value of the award is Rs.3,000/- to each student.
Mudit Sharma Memorial Gold Medal	Medal to a graduating student of B.Tech. (Engg. Physics) with the highest CGPA.
M.M. Chawla Gold Medal	Medal to a student securing highest CGPA in 5 year Integrated M.Tech. in Mathematics & Computting Programme.
Suman-Upma Gupta Memorial Gold Medal	Medal to a student securing the highest CGPA among all outgoing UG/DD/ Integrated M.Tech. girl student.
Pearl Award (Batches 1965-69)	The financial assistance to a maximum of three students/team every year from amongst the 3rd and 4th year students for attending Conference/ Seminar/ Workshop/ Design competition/ Academic event to present his/her work. The maximum value of each award is Rs.6000/-
Conexant Award	Financial assistance to a maximum of five students/teams every year for their travel for presenting a papr or exhibiting/demonstrating a model at a Conference/ Seminar/Workshop/Design Competition academic intercollege event. The maxi -mum value of each award in Rs. 7000/-.
Abhinav Dhupar Memorial Award	To a Graduating Civil Engineering student pursuing either higher studies or job in any field related to Civil Engineering.Value of Award is Rs.15,000/-.
Nayyar Perwez Shahabuddin Medal	Medal to the best graduating student of Mechanical Engineering Department. Selection criteria include CGPA, project undertaken, papers, patents, plans for higher studies and research potential.
Dr. P.L. Kapur Memorial Award	Partial Financial Assistance to one UG/PG student of Physics Department for presenting a paper at an International Conference. Value of Award is Rs.25,000/- per annum.
Dr. Shiv Raj Nandan Sinha Medal	Medal to the best UG/PG project in the area of Biomedical Engineering.

Dr. Kewal Krishan Baveja Medal	A final year Chemical Engineering UG/PG student. 1. CGPA amongst the top ten percent of the batch. 2. Participation in socio-cultural activities.
Excellence Award for best Project in HVAC&R (Heating, Ventilating, Air Conditioning & Refrigeration)	One award to be given for the best UG major project. Value of Award is Rs.5,000/-.
Sh. S. L. Duggal Excellence Cash Award	**Academic Excellence** : Only B.Tech. students of Department of Mechanical Engineering graduating with CGPA of 7.5 or above eligible for the award. **Leadership Qualities** : Should have demonstrated leadership qualities by getting involved in issues affecting student body, the Institute or the society in general. **Extracurricular Activities** : Involvement in sports, cultural or other extra-curricular activities of the Institute. Value of award is Rs. 25000/- and a plaque.
Mrs. Chander Kanta Nanda Excellence Award	Award will be given to one boy and one girl selected from the graduating B.Tech. students. a) Academic Excellence: B.Tech. students graduating with CGPA of 7.5 or above. b) Cultural Activities: The students should have demonstrated excellence in cultural activities of the Institute. Value of Cash prize is Rs.15000/-
Krishna Hari Saxena Award	Award will be given to one undergraduate student of Civil Engineering securing highest CGPA in 6th semester . The vaule of award is Rs. 10,000/- and a citation.
S.C.Mehrotra's Awards	Two awards will be given on merit-cum-means basis one each to an undergraduate student securing highest CGPA and the other to the highest CGPA securing SC/ST category undergraduate student. The value of the award is Rs. 15,000/- each.

6.2 POSTGRADUATE PROGRAMMES

Dr. Shankar Dayal Sharma (Former President of India) Gold Medal	To an M.Tech. student adjudged the best for General Proficiency, including Character and Conduct, and excellence in academic performance, extracurricular activity and social service.
Perfect Ten Gold Medal	This award is given to a graduating M.Tech. student securing a CGPA of 10.
O. P. Gupta Medal	To the best student (obtaining the highest CGPA) in M.Tech. Programmes in the Centre for Energy Studies. The value of medal is Rs. 7,000/-.
Dr. Neeraj Shrivastava Prize	To the top student of the M.Sc. graduating class in Physics. The value of the prize is Rs. 1,000/-.
Dr. Amrik Singh Gold Plated Medal & Prize	To the top student in Textile Engineering M.Tech. programme. The value of the prize is Rs. 1,000/-.
Dr. A. K. Sinha Cash Award	To the best M.Tech. student in Electrical Engineering based on the highest CGPA. The value of the prize is Rs. 1,500/-.
Mrs. Santokh Gill Award	To the top student in M.Sc. graduating class in Mathematics. The value of the prize is Rs. 1,000/-.
Jagat Ram Chopra Award	For the best M.Sc. Project, demonstrating a process/equipment/device/ sotware in Physics/Chemistry/Mathematics put together. The value of the award is Rs. 1,000/-.
Suresh Chandra Memorial Award	For the best Software Project in Computer Science & Engineering Department. The value of the award is Rs. 2,000/-.
NBCC Prize for Excellence	To the academically best student from amongst the five M.Tech. Programmes in (i) Construction Engineering and Management; (ii) Rock Engineering and Underground Structures; (iii) Structural Engineering; (iv) Geotechnical and Geoenvironmental Engg; (v) Water Resources, put together, of the Civil Engineering Department. The value of the award is Rs. 2,000/-.
Padmashri Man Mohan Suri Project Award	For the best innovative hardware oriented Major Project in M.Tech. Programme of Mechanical Engineering. The value of the award is Rs. 2,500.
Dogra Medal	For the best M.Tech. student in Construction Engineering and Management area of the Civil Engineering Department to be given to the student securing the higest CGPA. The value of the award is Rs. 5,000/-.
Dogra Educational Endowment Medal	For Ph.D. scholar for the best Scientific Publication in Bio-Medical Engineering.
Prof. K. S. Prakasa Rao Award	For securing the highest CGPA in M.Tech. programme in Power Systems in the Deptt. of Electrical Engineering. The value of the award is Rs. 1,500/-.
Lt. Arpan Banerjee Award	For the graduating student securing the highest CGPA in the three programmes, viz. M.Tech. (Engineering Mechanics), M.Tech. (Design Engineering) and D.I.I.T (Naval Construction) put together.
Chand Rani-Banarsi Dass Duggal Memorial Award	To an outstanding M. Tech. student of Industrial Tribology and Maintenance Engineering.
Prof. Pushpa Bajaj Gold Medal	This award is given to final year M.Tech. (Fibre Science and Technology) student with highest CGPA.
IEEE-PEDES 96 Award	This award is given to the best graduating M.Tech. student in Power Electronics, Electrical Machines & Drives.
FITT Awards	For the best industry relevant Ph.D. & M.Tech./ M.S.(R) / M.Des. / MBA Projects.

M.M. Chawla Gold Medal	Securing the highest CGPA in the M.Tech. programme in computer applications.
Shrimati & Shri H.R. Mittal Cash Award	For the best M.Tech. Project in the Applied Mechanics Department. The value of the cash award is Rs.5,000/-.
Parampujya Baba Sant Nagpalji Gold Medal	For securing the highest CGPA amongst the graduating students of M.Tech. Programme in Computer Science & Engineering.
Prof. M.C. Puri Memorial Medal	To the top student in M.sc graduating class in mathematics.
Excellence Award for Best Project in HVAC&R (Heating, Ventilating, Air-conditioning and Refrigeration)	To the best PG Major Project for a sum of Rs. 10,000/- with certificate.
Dr. Shivraj Nandan Sinha Medal	To the best UG/PG Project at IIT Delhi in the area of Biomedical Engineering.
Buti Foundation Bodh Raj Gold Medal	The award is to give one gold medal to the best Women Student securing the highest CGPA among the graduating students in M.Sc., M.Tech. and M.Des. programmes of the Institute.

7. STUDENT LIFE ON CAMPUS

The accent 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. This allows them to weave a pattern of life which equips them to stand up to the many pressures of community living, to train them in the making of inferences in everyday situations, to help them derive more insight into their personal relationships and to arouse in them a sensibility of aesthetic experience. Excellent facilities for the residence to a large number of students, co-curricular activities, sports and games recreation, shopping, etc., have been provided to the students on campus. Special efforts are made to promote student-teacher interaction. Students Counseling Service has been set up to assist students in their initial adjustment, as well as in any difficulties, they may have during their stay at the Institute.

7.1 HALLS OF RESIDENCE

There are nine boys' hostels and two girls' hostels. The boys' hostels are Nilgiri, Karakoram, Aravali, Jwalamukhi, Satpura, Zanskar, Kumaon, Vindyachal and Shivalik. 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. An additional hostel with a capacity of about 950 is under construction.

The Dean of Students, in his capacity as the President of the Board for Hostel Management, is the head of the hostel organisation. He is assisted in his administrative responsibilities by the Associate Dean of Students and the Assistant Registrar (Student Affairs). The Board for Hostel Management, the main function of which is to coordinate the working of all the hostels, has representation from all the hostels and takes decisions on all policies of common interest. The administrative head of each hostel, the Warden, is a senior faculty member. There is House Working Committee at the Hostel level. The House Working Committee of each hostel is composed of House Master, Warden, House Secretary, Mess Secretary, Sports Secretary, Cultural Secretary, Maintenance Secretary and Year representatives. It decides the pattern and the pace of life of each House. The BHM also arrange for students' election at various levels. The BHM staff members are being given Typhoid & other injections every year to avoid any infection to the Students.

For operational convenience, the House Working Committee has an Executive Committee and three other Sub-Committees-Mess Committee, Common Room Committee, and House Maintenance & Cleanliness Committee. There is a special Sub-Committee – House Honours Committee-to deal with disciplinary matters pertaining to each hostel. The deliberations of the House Working Committee in each hostel are governed by the Constitution for the House Working Committee. Working through this responsible body, the students themselves lay down appropriate norms of behaviour to suit different situations and social occasions in the hostels. The individuals respond to the situation and to the role, which they are called upon to play through their participation in the community life of their hostel. They begin to learn their role in different groups and observe the patterns of behaviour and attitude, which are expected of them.

Hostel Rules for Students

1) On arrival a student will report to the Caretaker or any other official of the hostel authorized by the Warden and will take possession of the room after signing the inventory of the furniture, electrical and other items in the room.
2) At the end of each semester a student shall vacate his/her room and hand over the charge of the room including all items on the inventory to the Caretaker or any other official of the hostel authorized by the Warden. Any student desirous of retaining his/her room during the vacation must seek prior permission of his/her Warden.
3) Any act of intimidation or violence, willful damage to property or drunken and riotous behavior constitutes an offence.
4) Use of narcotics, consumption of alcoholic beverages and gambling are strictly prohibited.
5) Use of audio equipment in hostels is acceptable only if it is not objectionable to other residents.
6) It is mandatory and ordinarily sufficient for a resident to inform the House Secretary/Warden about any guest(s) staying overnight with him/her. The Warden & House Secretary are empowered to deny permission if the situation so warrants. For longer periods, permission is to be sought from the Dean of Students/Associate Dean of Students.
7) The Hostel dues shall be paid as per the directives of the BHM.

The Institute has no policy for restricting the movement of students on or off the campus and does not exercise any control in respect. You are strongly advised not to venture out of the campus and should you do so, please inform your parents/local guardians regarding your movements off the campus.

8) **(a) For Male Students:**

(I) A student's parents and other male guests may visit him in his room.

(ii) Lady family members may be allowed to visit a student in his room with the permission of the Warden.

(III) Non-family lady visitors may be entertained by a student in the visitors' room in the hostel from 8.00 a.m. to 8.00 p.m.

(IV) Not Keep any Motor Driven Vehicle in the Campus. Violation of the rule shall attract heavy fine.

(b) For Female Students:

(I) All residents should be normally back in the hostel by 8.30 p.m.

(II) In the pursuit of their academic work, they may stay in their laboratories, computer center or library till 11.00 p.m. but be back in the hostel latest by 11.00 p.m.

(III) In case any resident has to stay out in the Research Laboratory or Computer Centre for Academic Work after 11.00 p.m., she may do so after making proper entries in the register regarding her name, name of the laboratory/computer center, time of leaving the hostel and expected time of return to the hostel. On her return, she will enter in the same register the actual time of her return.

(IV) If a resident wishes to stay out after 11.00 p.m. for any other purpose, she has to take prior permission of the Warden.

(V) No first year UG student is allowed to be outside the hostel after 9.00 p.m. for any reason without specific and -prior approval of Warden and making proper entries in the register.

(VI) Not keep any Motor Driven Vehicle in the campus. Violation of the rule shall attract heavy fine.

7.2 STUDENT AFFAIRS COUNCIL (SAC)

The student Affairs Council is a joint student-faculty Senate committee to deal with overall policy formulation, co-ordination and review of student affairs, which are of non-academic nature. The Director of the Institute is the Chairman of the Council. The Dean of Students is its Vice-Chairman. Its members include the Deputy Directors, the Dean (UGS) and the Dean (PGS&R), two Senate nominees, one House Master, Presidents of all Boards/Committees recognized by the SAC, past two Wardens, past Dean of Students, Assistant Registrar (Student Affairs), General Secretaries of the Boards/Committees recognized by the SAC, past two General Secretaries of the SAC, representatives from hostels and general bodies of M.Sc/M.Tech/MBA/Research Scholars/Married research Scholars/ Days Scholars. The council controls the budget and co-ordinates the activities of the various student organizations like the 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.

The Council has a Co-ordinating Committee consisting of the Director, Dean of Students, Presidents and General Secretaries of various boards, the General Secretary of the Council, and the Assistant Registrar (Students Affairs). The Council has an Executive Committee to take executive decisions. The Dean of Students is the Chairman and its members include the Associate Dean of Students, three SAC nominees and the General Secretary, SAC as the convenor. The Student Affairs Council is governed by its own constitution.

There are several awards Instituted for different activities within the hostel as well as outside to improve the life in IIT. One such award is Alumni Award for best Community Services, which is presented to the student contributions to the improvement of the IIT community life.

In addition to this there are several other awards like Best House Secretary, Best Mess Secretary, Best Maintenance Secretary etc. All these are presented annually.

The Council formed a Student's Cooperative Society, which runs a stationery store and provides stationery items to the students at no loss no profit basis.

7.3 ACADEMIC INTERACTION COUNCIL (AIC)

The Academic Interaction Council is a joint committee of undergraduate 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 of purely academic nature. In collaboration with the I.I.T. Alumni Association, it undertakes useful career planning discussions for students. It collaborates with the Training and Placement Unit in formulating appropriate training and placement policies for students. It also helps in promoting student-staff interaction.

Departmental Academic Committees, Class Committee and Course Committees are the constituent bodies of Academic Interaction Council which suggest ways and means to improve the quality of teaching and the rationalization of course content.

7.4 CO-CURRICULAR ACTIVITIES

I.I.T. Delhi provides a full measure of opportunity to 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. The co-curricular activities have four wings: Board for Recreational and Creative Activities (BRCA), Board for Sports Activities (BSA), Board for Student Publications (BSP), and Board for Students Welfare (BSW). In addition, there are the National Service Scheme (NSS), National Cadet Corps (NCC) and the National Sports Organization (NSO).

7.5 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, Hobbies Workshop and a large Dark Room, 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.

The large gymnasium hall is over 10 m high where the students have a place for badminton in inclement weather or to engage themselves in gymnastics. The Institute has a 16-exercise multi-gym. A large swimming pool with clean blue water makes their campus life cool in summer. The swimming pool is indeed the most popular sports for students during the hot summer. The pride of the Centre is its huge Amphitheater that can accommodate 2,000 persons. With a magnificent stage and attached green room its perhaps one of the finest of its kind in the country.

7.6 STUDENTS' CANTEENS

There are two canteens for the students one in Hostel area just opposite to Aravali Hostel and the other located in front of Library across the road. The Hostel area canteen is open normally from 4 p.m. till midnight. The other canteen runs during the Institute working hours. Working of both the canteens is looked after by the canteen cell of the Board of Hostel Management. There are Coffee and Cold drinks Kiosks in the Institute.

7.7 STATIONERY SHOP AND TELEPHONE BOOTH

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

7.8 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. These activities are conducted 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 Samity 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. Teams from a large number of colleges and Institutes all over the country participate in this annual event. Rendezvous comprises competitive as well as a few non-competitive events of drama, dance, music, oration, art, quizzing etc.

In the second semester, BRCA organizes cultural events during the student is 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.

The main aim of these extra-curricular activities is to promote the holistic growth and overall development of a student's personality. They also get an opportunity to explore and discover their hidden talent. By participation is such activities, the students can develop their ability to organize and create new forms of activities. They develop skills for effective oral and written communication. Those students who actively participate in the activities of BRCA are given various medals, certificates, awards and prizes in recognition of their talent, significant contribution and organizational skills.

These multifarious activities are co-ordinated by the Board of Recreational & Creative Activities, which is a constituent body of the Student Affairs Council. The Board comprises students and faculty members and is governed by its own Constitution.

7.9 SPORTS AND GAMES (BSA)

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

Well laid out fields are available on the campus. A cricket field, two cricket practice pitches, a hockey and a football ground, four volleyball and two basketball courts, one of which is ultra cushioned, eight tennis courts, tennis practice wall, three squash courts, one badminton hall, one table tennis hall, one yoga hall, a swimming pool, weightlifting/20 stations multi-gym, a stadium with 400 meters athletics track, jogging track and ancillary arrangements for all the games are available to the students. Floodlighting of football field is in progress and will be installed in next two months. Construction of synthetic tennis courts and floodlighting of Athletics track are in pipeline and will be added to the existing facilities very soon. 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 Institute is affiliated with the local associations in almost all the games to give outlet to the students for participation in different games outside the campus. The students take part in the Fresher’s events for incoming first year students, Friendly matches with the local collage, Inter Hostel events, the annual IIT Delhi Inter Collegiate Event Sportech and the annual Inter IIT Sports Meet. Students also participate in sporting activities organized by Institutes outside Delhi.

7.10 BOARD FOR STUDENT 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 General Secretary coordinates the activities of BSP. Three Chief Editors share editorial responsibilities. Two representatives from every hostel serve as link between the student community and the BSP. A senior faculty member is the President of the board who along with the Vice-President facilitates board’s activities.

Regular campus magazine, Campus Rumpus, provides an excellent forum for expression of student opinion about a wide spectrum of issues, reflections on the campus life and literary creations. Interviews and surveys and regular features of this publication. It has both English and Hindi sections. This publication is now being made available electronically on the web page of BSP to reach out to the students and alumni at large.

The board also publishes, among other magazines, Cornucopia, which is an anthological compendium on interesting topics and personalities. It brings out an annual bilingual magazine called Contact. Contact is distinguished by the richness of its content and imaginative presentation. Workshops as well as competitive events are organized from time to time to enable students pursue their interest and sharpen their skills. Every year BSP organises annual literary festival – literati.

Publications of the board receive significant support and encouragement from the campus community with contributions coming from all sections of student and faculty. The freedom enjoyed by these publications is comparable to that enjoyed by campus magazines anywhere in the world.

7.11 BOARD FOR STUDENT WELFARE (BSW)

BSW consists of student representatives from each hostel and a few faculty members. This board has been constituted to help the students in the hour of need. BSW gives financial help to students and looks after other modes of their welfare. Presently, the Board functions through four of its units, viz. Publicity Committee, Job Committee, Financial Aid Committee, Welfare Committee and also looks after the functioning of the Student Cooperative Store (SCOOPS). A senior faculty member is a Presidents of the Board who along with the Presidents of each committee helps to channelise its activities. The Publicity Committee exposes the new entrants to activities of BSW while Job Committee looks after the task of providing jobs to needy students both during the semester and the vacations. The Financial Aid Committee takes care of all financial emergencies of students and can grant short-term loans, such as, for clearing emergency hospital or hostel bills. It also provides grants-in-aid to deserving students to pay tuition fee and to buy books. The Welfare Committee works for the welfare of the entire student community and arranges notebooks, greeting cards, T-shirts Souverir of IIT Delhi and other stationery items etc., which are sold by SCOOPS. **BSW also arranges seminars/workshops, with the help of faculty members, for needy students to help them improve their inter personal communication skills which contribute to their overall personality development.**

7.12 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”. Unity implies our basic oneness and Discipline is the very bedrock on which any growing nation is founded. **The Institute has an NCC Coy. Comprising of 54 cadets which is affiliated to infantry Battalion, 7 Delhi Bn. NCC under Gp.Hq. 'c', New Delhi. Training to students (cadets) are given through drills, parades, camps and various outdoor activities under the guidance of faculty programme Officer.**

7.13 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 the students through community service.

At IIT Delhi, National Service Scheme, IIT Delhi is one of the three options that UG students have in addition to NCC and NSO.

NSS, IIT Delhi is organized into five clubs: (i) Energy and Environment Club, (ii) Health and Wellness Club, (iii) Social Awareness and Education Club, (iv) Outreach and Publications Club and (v) Sustainable and Innovative Technologies Club. Each of these clubs organizes a wide variety of activities throughout the academic calendar to enable students to gain valuable exposure to challenging societal issues. Students are also encouraged to take up short duration projects on various issues related to social welfare.

At IIT Delhi, students who enroll for NSS are required to register for the non-credit course NSN100. Each student is expected to participate in activities. If a student is unable to complete this requirement in the first year, he/she must complete it by the end of his/her second year. Students who do not complete the NSS requirement within the first and second years of his/her stay at the Institute are not permitted to register for any other courses in their 5th semester.

Some of the activities organized by NSS in the year 2008-2009 include Self- Encounter Workshops, AIDS Awareness Workshops, guest lectures by eminent speakers, tree plantation campaign, blood donation camp, paper recycling campaign, no smoking compaign among others.
see Courses of Study for complete details.

7.14 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. National Sports Organisation (NSO) activities are organized by the sports unit as an alternative to NCC and NSS. Over 250 undergraduate students are registered annually and get specialized training in games and sports as well as physical fitness. Regular classes are conducted for these students by the Physical Education staff of the Institute for four days a week in each semester.

Every year first year B.Tech. students are admitted in NSO by virtue of their aptitude and abilities in various games and sports activities during their school career. Their entry into NSO is decided by a Committee constituted for the purpose. The students are required to undergo Physical Education Training four days a week and complete 100 hours attendance (50 hours in each semester). Physical education training is imparted in most of the games as well as athletics according to the option given by the students on their enrollment for the NSO. From this year, for further upgrading the programme of NSO, Tennis, Aerobics & Karate classes had also been introduced along with the other running programms.

7.15 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.

In addition to providing counseling to individual students seeking help, the SCS also holds number of self-development programmes through group discussions and workshops for Life skills training, coping strategies and personality development.

The “Relaxation Room “of SCS is a soundproof air-conditioned room, which is well equipped with three kinds of biofeedback instruments. There is a self- assessment software and a small library for the benifit of students.

The head of SCS is an ex- officio President of BSW. The center has a full time counselor. A visiting part time counselor, speech pathologist and a psychiatrist.

7.16 DEPARTMENTAL PROFESSIONAL SOCIETIES

Most of the Departments/Centres 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.

7.17 BENEVOLENT FUND SCHEME

The Institute has an I.I.T. Benevolent Fund Scheme for the benefit of its students. All students admitted to the Institute are required to donate on ‘One Time Basis’ (only once during their studies) an amount of Rs.100/-. This amount shall be recovered from the students at the time of their registration.

Benefits

In the case of death of any student due to any reason while undergoing studies at the Institute, the Institute shall pay an outright grant of Rs. 1,00,000 (Rupees One lakh only) from the interest received on investment of the Corpus of the Benevolent Fund.

The amount of grant will be payable to the person nominated by the student on a nomination form filled in by the student at the time of initial registration as a student of the Institute.

7.18 INSURANCE POLICY

With a view to providing comprehensive benefits to students while pursuing studies at the Institute, the Institute has introduced a Group Insurance Policy (including Group Medical Insurance). This covers all students i.e. U.G., P.G., part-time, sponsored students etc. The premium payable is about Rs. 450.00 per annum (liable to change in the subsequent years as per the tariff schedule of the Insurance Company). The premium will be collected at the time of registration for the 1st semester every year along with other dues.

7.19 MEDICAL FACILITIES

The Institute has a hospital centrally situated in the campus. It provides facilities for OPD treatment and admissions. It has a Pathology Lab. providing facilities for blood, urine, stool examination and biochemical tests, equipped with a semi-auto analyzer. The X-ray Department undertakes routine radiography. There is a Physiotherapy Unit with modern equipment. The Dental Unit provides dental facilities by dental surgeon and technician. It has separate dental X-ray machine. The Electrocardiogram (ECG) facility is also available. A small Intensive Care Unit (ICU) has been started with bedside ECG monitor, Cardiac defibrillator etc. Nebuliser for aerosol therapy is available in emergency for patients who come in acute attack of Bronchial Asthma.

The hospital is headed by Chief Medical Officer (CMO), a Specialist in Medicine and Cardiology assisted by one Sr. Medical Officer (S.M.O.), and seven Medical Officers (MO) including one homeopathic MO. Most of the fulltime doctors are having postgraduate specialist qualification in medicine, pediatrics and gynaecology. The hospital is also visited by part time specialists in Orthopaedics, Eye, E.N.T. & Skin from All India Institute of Medical Sciences (AIIMS) beside other part time visiting specialists in Psychiatry, Dental & Ayurvedic. There are seven nurses and other paramedical staff. The emergency medical facilities are available round-the-clock with 24 hours ambulance service for taking patients from campus to IIT Hospital and transfer of serious patients to All India Institute of Medical Sciences (AIIMS) and Safdarjang Hospital.

At the time of registration the newly admitted undergraduate (UG), postgraduate (PG) and research scholars are required to submit medical fitness Certificate (on the prescribed format) from a registered medical practioner.

Medical aid is provided during Sports Meets etc. Various demonstrations in first-aid, AIDS and Cardio-pulmonary Resuscitation (CPR), are given to the students and other staff of the Institute.

Besides our doctors, a team of family welfare workers from the Family Planning Association of India, R.K.Puram branch, conduct fortnightly visits and carry out the Family Planning Schemes (motivation of sterilization, Cu-T insertion, etc.). In addition they do maternity and child welfare work and immunization against diptheria, whooping cough, tetanus and poliomyelitis etc. IIT Delhi Hospital is the recognized centre for Pulse Polio Immunization, Measles, Matri Suraksha Abhiyan and other programmes by the Government.

The Insurance scheme (see section 7.18) also provides medical benefits.

7.20 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 evaluating 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.

Ragging in any form is banned in IIT Delhi. The Institute treats ragging as a cognizable offence and stern action will be taken against the offenders. To safeguard its ideals of scholarship, character and personal behaviour, the Institute reserves the right to penalise any student at any time for any reason deemed sufficient.

7.21 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.

7.22 STUDENT-TEACHER INTERACTIONS

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

7.22.1 Student–teacher interaction committee (STIC)

In a teaching institution, it is necessary that there should be a good rapport between the teacher and the taught. They should be able to freely communicate with each other. They must understand and appreciate each other's viewpoint not only on academic matters but in matters of general interest as well. A few salient features of the scheme are:

The newly admitted first year students are divided into groups, each of about 10 students. Each of these groups is assigned to a faculty member to be known as student adviser. These advisers advise the students on their academic matters and monitor their academic performance. They also, to the extent possible, cover personal problems of their students. Students are encouraged to contact their adviser whenever they feel necessary. To aid the student advisers in discharging their responsibilities, students mentors are identified from the senior classes to be a bridge between the adviser and advicee.

Once in a semester every student is encouraged to invite one of his teachers and his/her spouse for dinner/lunch in his hostel. These dinner programme is termed STIC dinner. STIC bears major part of the expenditure for the scheme.

For the purpose of promoting interaction, the scheme also provides funds to the departmental professional societies.

Any student or teacher can submit a proposal, which will strengthen the student-teacher interaction. The reasonable expenditure involved will be shared by the schemes.

A new Scheme has been introduced which encourages combined student-teacher functions at the Department level. The students and teachers meet once in a semester. The cost of the get together shall be borne by the STIC.

7.22.2 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. There are students advisors in all engineering and science departments to advise students on academic and other matters. Informal contact between students and teachers is also encouraged.

7.22.3 Student advisers

A student adviser is appointed by the Department for a group of 10-12 student in the B.Tech., dual-degree and Integrated M.Tech. programmes. Student are encouraged to keep in constant touch with his/her adviser regarding all academic affairs. The advisor, in turn, will provide the student with suitable advice regarding courses, academic load, and rules and regulations, etc. governing his/her academic programme. 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.

7.22.4 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 advice matters.

7.23 ALUMNI ASSOCIATION

Since its inception, over 33630 have graduated from IIT Delhi in various disciplines including Engineering, Physical Sciences, Management and Humanities & Social Sciences. Of these, nearly 3403 received a Ph.D. degree. The number of students who graduated with a B.Tech. is over 11600. 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 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.

These 33630 alumni have come together to form IIT Delhi Alumni Association with the objective of providing a platform for networking between themselves, and between the alumni and its alma mater, IIT Delhi. They do so by organizing various professional, social and cultural activities each year. Other than organizing the annual general body meeting, reunions, sports events and picnics, the Alumni Association organizes lectures by distinguished speakers and panel discussions on topics of current interests to its members. More recently, the Alumni Association has gotten involved with career counselling for current students at IIT Delhi.

Every person who receives a degree or a diploma from the Institute automatically becomes a life member of the Association. In addition to participating in activities of the association, members can access Institute facilities, including library, sports facilities and guest house at nominal charges through the Association's office located at IIT Delhi. This office also maintains a database that contains contact information on all alumni. This database, an electronic newsletter, and other services can be accessed through its website www.iitdalumni.com

The office of the Dean, Alumni Affairs and International Programmes provides a one-stop window for interaction between the alumni and IIT Delhi, including its administration, faculty and students. The alumni interact with IIT Delhi in several different ways. Other than accessing facilities on the campus to organize their events, the alumni in India and abroad contribute to various programmes at IIT Delhi in different ways. These include but not restricted to (a) providing feedback on undergraduate and postgraduate programmes at IITD (b) giving lectures and career counselling (c) instituting awards & scholarships for students (d) help establishing chair professorship (e) instituting awards and fellowships for faculty (f) providing conference support for students (g) providing funds and support for establishment of new schools (h) providing funds for construction/ renovation of infrastructure.

The office of the Dean helps highlighting the achievements & contributions by the Alumni. The Institute recognizes their achievements & contributions by conferring Distinguished Alumni Awards & Distinguished Alumni Service Awards. The office also maintains a database of the alumni. The alumni are updated regularly about the alumni activities, achievements, contributions and the Institute activities through a quarterly electronic newsletter eConnections. Information relating to the office of the Dean Alumni Affairs is available at www.iitd.ac.in/alumni/ .

The IIT Delhi Excellence Foundation (IITDEF) facilitates contributions from alumni in USA for various programmes listed above and helps in identifying potential faculty and visiting professors from various universities in USA.

7.24 RAGGING

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

8. DEPARTMENTS, CENTRES and SCHOOLS

Department of Applied Mechanics

Professor and Head

Y. Nath, *Ph.D. (IIT/M)*	Computational Mechanics, Dynamics of Composite Plates and Shells Railway Vehicle Dynamics, Chaos.

Professors

Suhail Ahmed, *Ph.D. (IIT/D)*	Structural Dynamics, Off-shore Structures, Structural Reliability.
Anupam Dewan, *Ph.D. (IISc Banglore)*	Computational Fluid Dynamics & Heat Transfer, Modelling of Engineering Turbulent Flows, Heat Transfer Enhancement.
S.K. Gupta, *Ph.D. (IIT/D)*	Phase Transformations, Mechanical Behaviour of Materials.
S. Kapuria, *Ph.D. (IIT/D)*	Smart Composite and Sandwich Structures, Finite Element Analysis, Offshore Structures and Pipelines, Solid Mechanics, Stress Analysis of Pressure Vessels.
Puneet Mahajan, *Ph.D. (Montana State Univ.)*	Finite Element Methods, Composites and Low Velocity Impact Behaviour, Snow Mechanics.
Sanjeev Sanghi, *Ph.D. (City Univ. of New York)*	Numerical and Analytical Studies of Turbulent Flows, Chaos and Dynamical Systems, Computational Fluid Dynamics, FEM, Educational Software.
D.K. Sehgal, *Ph.D. (IIT/D)*	Numerical and Experimental Stress Analysis, Finite Element Methods in Solid Mechanics, Optimum Shape Design.
P. K. Sen, *Ph.D. (IIT/D)*	Hydrodynamic Stability, Laminar Turbulent Transition, Turbulence, Thermo-fluid Mechanics, Computational Fluid Dynamics.
S.N. Singh, *Ph.D. (IIT/D)*	Fluid Mechanics, Internal Flows, Computational Fluid Dynamics, Two-phase Flows, Flow Instrumentation.
S. V. Veeravalli, *Ph.D. (Cornell)*	Experimental Investigation of Turbulent Flows, Pollutant Dispersion, Stability Theory, Design Methodology of Dams.

Associate Professors

B. P. Patel, *Ph.D. (MNNIT, Allahabad)*	Nonlinear Static/Dynamic Analysis of Shells, FEM, Composite Structures, Functionally Graded Structures, Smart Structures, Bimodular Composite Structures, Damage Mechanics.
Rajesh Prasad, *Ph.D.(Cambridge)*	Physical Metallurgy, Elastic Effects in Phase Transformations, Amorphous and Metastable Phases, Structure of Solid-Solid Interfaces, Thin Films.

Assistant Professors

Murali R. Cholemari, *Ph.D. (I.I.Sc., Bangalore)*	Turbulent Flows, Optical Flow Measurement, Applied Fluid Mechanics.
M. K. Singha, *Ph.D. (IIT/Kgp)*	Stability, Dynamics and Optimization of Structures, Composite Structures, Smart Structures.
Balaji Srinivasan, *Ph.D. (Stanford)*	Computational and Theoretical Fluid Mechanics, Multiscale Phenomer, Numerical Analysis, Turbulent Flows, Interfacial Flows.

Senior Systems Programmer

S. Hegde, *Ph.D. (IIT/D)*	System Programming, Finite Element Analysis, FE Mesh Generation, CAD and CAM, Heat Transfer, Hydrodynamic Stability.

Adjunct Faculty

S. K. Rao, *M.Tech. (IIT/Kgp)*	Submarine Design, Ship Resistance and Propulsion.
V.K. Satyam, *M.Sc. (Naval Academy, Russia)*	Naval Construction and Submarine Design.
V.S.Swaminathan, *M.Tech. (IIT/Kgp)(Superannuated)*	Ship Structure, Manuvering and Seakeeping.

Chair Professors

N. K. Gupta, *Ph.D. (IIT/D)*	Impact Mechanics, Theory of Plasticity, Composite Materials, Crashworthiness of Vehicles.
R. K. Mittal, *Ph.D. (Johns Hopkins)*	Composite Materials, Experimental Stress Analysis, Mechanical Behaviour of Polymers.
R.K. Pandey, *Ph.D. (IIT/B)*	Physical Metallurgy and Materials Engineering Fracture Mechanics, Failure Analysis.
C.V. Ramakrishnan, *Ph.D. (IIT/K)*	Computational Mechanics, CAD and CAE, Finite Element Methods, Parallel Computing and Computational Algorithms.
V. Seshadri, *Ph.D. (Brown)*	Solid-liquid Flow, Pipeline Engineering, Flow through Fluid Machines, Flow Instrumentation, Bio-fluid Mechanics.

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

Academic Programmes

Undergraduate

Courses in Mechanics, Experimental Methods and Analysis, Design Engineering and Materials Science are offered by the Department as part of the core programme of education to the undergraduate students of all disciplines. In addition, courses in Solid Mechanics, Fluid Mechanics, Engineering Materials, Design Engineering and other electives are offered for some disciplines. The Department also offers a Minor Area specialization in 'Computational Mechanics and Computer Aided Design'.

Postgraduate

The Department offers post-graduate programmes leading to the degree of (i) M.Tech. in Engineering Mechanics with specialisation in (a) Stress Analysis and Computer Aided Design, and (b) Fluid Engineering; and (ii) M.Tech. in Design Engineering. It also offers an M.S. (Research) Programme in Applied Mechanics. It also runs a Postgraduate Diploma Course in Naval Construction in collaboration with the Indian Navy. The course is one and half years' duration and is open to sponsored officer-trainees of the Indian Navy.

Research

Doctoral and post-doctoral researches are carried out in the Department in the following areas:

1. Elasticity, Plasticity, Large Deformations, Manufacturing Analysis, Impact and Crash Worthiness, Composite Materials, Composite Plates and Shells, Non-linear Dynamics, Off-shore Structures, Smart Structures, Snow Mechanics, Computational Methods for Stress Analysis and Structures, Structural Optimization, Finite Element Methods, Seismic Analysis of Tall Buildings, Parallel Computing, Non-linear Dynamics and Chaos.
2. Computer Aided Design, Design Engineering, Reliability, Availability and Maintainability Engineering.
3. Elastic-Plastic Fracture Mechanics, Kinetics of Fatigue Crack Growth, Microstructure and Fracture Toughness, Failure Analysis and Residual Life Estimation, Strength and Deformation Behaviour of Alloys, Thermomechanical Methods.
4. Bio-fluid Mechanics; Computational Aerodynamics; CFD - Computational Fluid Dynamics (includes DNS - Direct Numerical Simulation, LES - Large Eddy Simulation, DES - Detached Eddy Simulation, RANS - Reynolds Averaged Navier Stokes etc.), Internal Flow - Aircraft Engine Intake Ducts and Combustors; Hydrodynamic Stability Theory; Low-dimensional Models and Chaos; Micro-air Vehicles; Optical Flow Diagnostics (PIV - Particle

Image Velocimetry and Micro PIV); Pipeline Engineering; Pollution Dispersion; Supersonic and Hypersonic Flows; Turbulence; Turbulent Boundary-layer Stability and Control; Two-phase Flows.

Besides, the Department offers research opportunities and 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 project sponsored by the Government agencies and private industrial organizations.

Laboratory Facilities

The Department has well-equipped laboratories, workshop and library facility. Some details of laboratories are as follows: -

Computational Lab: The laboratory has latest PCs and workstations, and softwares such as ABAQUS/ NESUS/ Catia, I-DEAS, Ansys.

CFD Laboratory: Workstations; Linux Cluster; Software such as FLUENT, STAR CD.

Design Optimization Lab: Workstations , Intel Xeon, dual Processor, Softwares such as IDEAs, NASTRAN/ PATRAN, ABACUS, Ansys, Catia, I-DEAS, MathCAD, Matlab.

Fluid Mechanics Lab: Some prominent equipment in this lab are pilot plant test loop for slurry transportation, pilot plant for flow rate measurement up to 8 cusecs, Bohlin viscometer, Weissenberg Rheogoniometer etc.

Gas Dynamics Lab: Industrial Wind Tunnel, Environmental wind tunnel and low turbulence wind tunnels, Hot wire sets, Wide angle diffuser rigs, Micromanometer, FFT analyzer, Multi-channel pressure measuring system etc.

Impact Mechanics Laboratory: The laboratory has Split Hokkinson Bar apparatus, Resin Transfer Moulding Machine, Digital storage oscilloscopes etc.

Materials Science & Physical Metallurgy Lab: The laboratory has modern metallographic equipments e.g. Buelher automet polisher, Duel polishing machine, Environment controlled heat treatment furnaces (programmable), Vickers and Rockwell hardness testers. Neophot –30 and Carl Zeiss microscopes with camera, Image Analyser, Shimazu Microhardness tester, Rolling mill, Wire drawing bench, Spectroscopic Alloy Analyser etc.

MTS Lab: The lab houses a 250 KN and 25 KN MTS machine with facilities for mechanical testing, fracture mechanics testing and fatigue testing etc.

Strength of Materials Lab: Modern mechanical testing facilities are available with the laboratory such as 25 T Computerized Universal Testing Machine (Zwick), 50 T Instron m/c, 10T and 100T hydraulically operated Universal Testing m/c, Avery machines for hardness, impact, torsion and fatigue testing.

Stress Analysis Lab: The lab consists of equipments such as photoelastic bench, Moiré fringe equipment, Digital strain meters, Super data loggers, Stress freezing ovens, Digital reflection polariscope, etc.

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

Department of Biochemical Engineering and Biotechnology

Professor and Head

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

Professors

G.P. Agarwal, *Ph.D. (Rice Univ., Houston)*	Bioprocess Engineering, Membrane Based Protein Separation, Bioinformatics, Membranes for Heavy Metal Ions Removal and Waste Treatment.
V.S. Bisaria, *Ph.D. (IIT/D)*	Enzyme and Metabolic Regulation, Bioconversion, Plant Cell Biotechnology, Microbial Technology.
Subhash Chand, *Ph.D. (IIT/D)*	Bioprocess Engineering, Enzyme Science & Engineering, Biosensors Environmental Biotechnology, Biotechnology Resource Planning & Business Development.
Saroj Mishra, *Ph.D. (City Univ., New York)*	Molecular Enzymology of Hydrolytic Enzymes, Yeast Expression Systems, Enzyme Mediated Bioremediation.
S.N. Mukhopadhyay, *Ph.D. (IIT/D)*	Transfer Processes, Microbial Reaction Kinetics, Bioconversion, Bioprocess and Environmental Engineering, Ecological Engineering, Food Biotechnology.
T.R. Sreekrishnan, *Ph.D. (IIT/D)*	Waste Engineering, Environmental Biotechnology.
A.K. Srivastava, *Ph.D. (McGill Univ., Montreal)*	Biochemical Engineering, Modelling, Optimisation and Control of Bioprocesses, Plant Cell Biotechnology.

Associate Professors

Prashant Mishra, *Ph.D. (JNU)*	Enzyme Science and Engineering, Pharmaceutical Proteins, Bio-Nano-Technology, Drug delivery.
Atul Narang, *Ph.D. (Purdue Univ., West Lafayette)*	Systems Biology of Microbial Gene Regulation.
P.K. Roychoudhury, *Ph.D.(IIT/D)*	Bioprocess Engineering, Cell Culture Engineering.

Assistant Professors

Ravikrishnan Elangovan, *Ph.D. (Florence Univ., Italy)*	Single Molecule Biophysics,Fluorescence Spectroscopy, Molecular Motors, Skeletal Muscle Mechanics.
Ritu Kulshreshtha, *Ph.D., (Delhi Univ.)*	RNAi Technology, MicroRNAs in Cancer Biology, Cancer/Disease Biomarkers, Hypoxia Research.
Shilpi Sharma, *Ph.D. (LMU Munich, Germany)*	Functional Microbial Ecology, Biogeochemical Cycles, Bioremediates, Biofertilizers, Enzyme Science, Plant Cell Biotechnology, Microbial Biodiversity in Environmental Samples.
D. Sundar, *Ph.D. (Pondicherry Univ.)*	Interrogating DNA-protein Interactions, Bioinformatics, Biotechnology of Secondary Metabolite Biosynthesis.

Chief Scientific Officer

Vikram Sahai, *Ph.D. (IIT/D)*	Instrumentation and Control, On-line Analysis, Microbial and Enzyme Technology, Bioprocess Engg., Bioprocess Scale-up, High Density Cultivation of Recombinant Cells, Biofertilizer & Biopesticide.

The Department has 16 faculty members with background in chemical/biochemical engineering, biochemistry, microbiology and molecular biology.

Academic Programmes

Department of Biochemical Engineering & Biotechnology runs a five year Dual Degree Programme in Biochemical Engineering & Bio-technology (to JEE qualified students), a 4 semester M.S. (Research) Programme, and offers

opportunities for Ph.D. and post-doctoral research. Under the Dual Degree Programme in Biochemical Engineering and Biotechnology both B.Tech. and M.Tech. degrees are awarded after 5 years. The Department undertakes sponsored research and provides consultancy services to industries in various areas of Biochemical Engineering and Biotechnology. Seminars, symposia, workshops and short-term refresher courses in frontier areas of Bioprocess Engineering, Recombinant DNA Technology and allied areas for participants from universities, industries and government organizations are organized periodically.

Research

The current research areas of the Department fall under the following major categories:

(a) Microbial and Enzyme Engineering.

(b) Bioseparation and Downstream Processing.

(c) Animal and Plant Cell Culture.

(d) Environmental Biotechnology.

(e) Biosensors and Bioprocess Automation.

(f) Microbial Biochemistry/ Metabolic Regulation.

(g) Bio-Nano-Technology and Biological Molecular Machines.

(h) Molecular Biology and r-DNA Technology of Industrial Enzymes and Speciality Products, Development of alternate expression systems in bacteria.

(i) Protein Conformational Study and Structure - Function Relationship using Biophysical Methods.

(j) Bioinformatics.

Laboratory Facilities

The Department offers courses at various levels in Biochemistry, Microbiology, Physical and Chemical Properties of Biomolecules, Bioprocess Principles, Molecular Biology & Genetics, Metabolic Regulation and Engineering, Bioprocess Engineering, Enzyme Science and Engineering, Bioseparation, Biological Waste Treatment, Bioprocess Plant Design, Modelling and Simulation, r-DNA Technology, Protein Engineering, Immunology, Plant and Animal Cell Technology, Biotechnology in Food Processing, Bioinformatics and Combinatorial Biotechnology. For details, see Courses of Study booklet.

The Department is well equipped for the teaching and research programmes 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; HPLC, GC and other chromatography systems; ultra-filtration unit, visible and UV spectrophotometer, CD Spectropolarimeter, Spectrofluorimeter; ultracentrifuge, ultrasonic disintegrator, laminar flow chamber, anaerobic work cabinet, viscometer, lyophilizer, microbial mutation facility, isoelectric focussing unit, scanning laser densitometer, scintillation counter, UF system, FPLC, PCR, electroporation-electrofusion system and facility for working with radioisotopes. Manual nucleic acid sequencing facility, Kodak auto developer. Other infrastructural facilities include 250 KVA diesel generating set, a 5 KVA uninterrupted power supply system for micro computer and peripherals, boiler, automatic steam sterilizer, constant temperature rooms (37 and 4°C), air compressor and chilled water units. A separate computation lab with several PCs is also available. For transferring lab scale data to industrial scale, pilot plant facility is available. Biotechnology information Sub-centre (sponsored by Department of Biotechnology, Ministry of Science & Technology, Government of India) is also housed in the Department.

Ph.D. Research 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 WasteTreatment, Bioenergetics, Biological molecular machines, Biosensors, Protein engineering and structure-function relationship of industrially important proteins. Drug delivery systems; expression/production of α interferon from *Pichia Pastoris*.

Department of Chemical Engineering

Professor and Head(Petrotech Chair)

A. N. Bhaskarwar, *Ph.D. (I.I.Sc., Bangalore)*	Chemical Reaction Engineering, Interfacial Engineering, Pollution-prevention Technologies and Chemical Product Design.

Professors

S. Basu, *Ph.D. (I.I.Sc, Bangalore)*	Interfacial & Electrochemical Engineering, Hydrogen and Fuel Cell Technology, Enhanced Oil Recovery.
A. K. Gupta, *Ph.D. (IIT/K)*	Mass Transfer, Ion Exchange and Adsorption.
S. K. Gupta, *Ph.D. (Brooklyn)*	Transport Phenomena, Membrane Separation Processes.
K. D. P. Nigam, *Ph.D. (UDCT, Mumbai)*	Modeling of Flow Systems, Inline Mixing and Multiphase Reactors.
B. Pitchumani, *Ph.D. (IIT/M)*	Particle Technology, Nano-Particle Production.
D. Phaneswara Rao, *Ph.D. (Idaho)*	Mixing, Gas-Liquid Reactor Design, Reactor Dynamics and Control.
T. Rajeswara Rao, *Ph.D. (I.I.Sc., Bangalore)*	Chemical Reaction Engineering, Fluid-Solid Reactions and Reactors and Biomass Conversion Processes.

Associate Professors

Rajesh Khanna, *Ph.D. (IIT/K)*	Interfacial Science & Engineering, Thin Liquid Films, Mass Transfer and Numerical Methods.
Ratan Mohan, *Ph.D. (IIT/K)*	Computational Fluid Dynamics, Process Engineering and Thermodynamics.
K. K. Pant, *Ph.D. (IIT/K)*	Heterogeneous Catalysis & Reactor Kinetics, Catalytic Hydrocarbon Conversion Processes, Water Treatment.
Anurag Rathore, *Ph.D. (Yale Univ.)*	Biosimilars, Bioprocessing, Quality by Design(QbD), Process Analytical Technology(PAT), Multivariate Data Analysis(MVDA).
Shantanu Roy, *Ph.D. (Washington Univ. St. Louis)*	Multiphase Reaction Engineering.
A. K. Saroha, *Ph.D. (IIT/D*)	Multiphase Reactors, Environmental Engineering.

Assistant Professors

O. P. Amar, *M.Tech. (IIT/K)*	Process Equipment Design.
Vivek V. Buwa, *Ph.D. (IIT/B)*	Computational Fluid Dynamics, Multiphase Flows, Reactor Engineering.
Sudip Pattanayek, *Ph.D. (IIT/B)*	Polymer Physics, Biopolymer Under Flow, Polymer Nano-Composites.
Jayati Sarkar, *Ph.D. (IIT/K*)	Instabilities, Adhesion, Debonding, Dewetting and Pattern Formation of Soft Thin Flims, Interfacial Science, Computational Fluid Dynamics, Self Organization of Complex Fluids and Granular Materials.
Munawar A. Shaik, *Ph.D. (IIT/B)*	Process Systems Engineering, Process Operation, Planning and Scheduling of Batch and Continuous Processes, Modeling and Optimization, Evolutionary Computation.
Anupam Shukla, *Ph.D. (IIT/K*)	Membrane Synthesis & Separation, Electrochemical Systems.
Sreedevi U., *Ph.D. (IIT/Kgp*)	Heterogeneous Catalysis, Green Industrial Processes, Modelling of Fluid Reactions in Composite Manufacturing.

Systems Programmer

J. K. Jain, *DIIT (IIT/D)*	Object Oriented Database Management Systems, Object Oriented Languages and Computer Networking.

The Department offers instructions at undergraduate level leading to 4 year B.Tech. degree and 5 year Dual-degree leading to B.Tech. and M.Tech. and at postgraduate level leading to M.Tech./M.S. (Research) and Ph.D. degrees. The instruction 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 laying emphasis again on the country's current and future requirements in industry, R&D organizations, design firms and academic institutions. Opportunities are provided to the students at all levels to get acquainted with the latest developments in the various areas of Chemical Engineering. Our Department also offers an M.Tech. programme, through a video-link, for Ethiopian students a Addis Ababa.

The Department maintains a close liaison with a large number of chemical/biotech industries and design organizations, and continuously upgrades the course curriculum. Industry-oriented developmental projects are undertaken regularly with and without industrial sponsorships. Students are encouraged to identify industrial problems and participate actively in sponsored programmes from outside. In-plant training in industrial organizations is a part of the regular undergraduate curriculum. The Department also undertakes consultancy assignments from industry, in the areas of Process Development, Design, Pollution Control, Particle Technology, Biomass Utilization, Interfacial Engineering, Petroleum Engineering, Bioseparations, Quality by Design, Process Analytical Technology, and Product/Process Development etc.

The Department is well equipped for carrying out basic and applied research leading to the degrees of M.Tech./ M.S.(Research) and Ph.D. In addition to the infrastructural facilities, pilot plant sized equipment, as well as advanced instruments are available. These serve the purposes of training of undergraduate students, as well as carrying out research work for final application to solve industrial problems.

Some of the pilot plant sized equipment available in the Department are liquid-liquid extraction column, autoclaves, large capacity blowers, compressors, gasifiers, combustors, pyrolysis systems, bubble columns, packed columns, circulating fluidized beds, batch and continuous flow reactors, an innovative heat exchanger, and a carbon-dioxide absorption system.

Analytical facilities and other instruments include GCMS, TGA, DTA, TPD/TPR, sub-micron particle size analyzer, powdered particle shape analyzer, high speed photographic equipment, data loggers, high speed multipoint recorders, XRF, HPLC, Ion chromatograph, CHN analyzer, Haake viscometer, GC with Mass Spectrometer, Atomic Absorption Spectrometer, Automatic Contact Angle Goniometer and Tensiometer and a Radioactive Particle Tracking System (RPT) etc. Extensive computing facilities and software like Aspn Plus, SimSci, Fluent, CFX are available which undergraduate and research students extensively use. Research seminars involving departmental and outside speakers are organized regularly to promote interest in fundamental as well as applied research. Specialized refresher courses are organized for the benefit of engineers from industry and government organizations as a part of Continuing Education Program. In addition, summer and winter schools under QIP are also organized. The Department has set up a state-of-the-art pollution control and testing laboratory and a process research laboratory provided with 40 intel core 2 duo personal computers and a state-of-the-art Tata-Honey Well Automation Laboratory.

Academic Programmes

Undergraduate

The Department offers undergraduate courses leading to a B.Tech. Degree in Chemical Engineering. Theory courses are well supported by a large number of experiments. Some of the special features of this program are: (i) Engineering Science Education rather than technology-oriented education; and (ii) extensive courses on Process Plant Design including mechanical design of process equipment. Technology and other important subjects are covered in the form of additional elective courses some of which are: Computer Aided Design, Environmental Engineering, Fluidization Engineering, Interfacial Engineering, Introduction to Biochemical Engineering,Bioprocessing and Bioseparations, Plant Safety, Petroleum Refinery Engineering, Process Engineering, Powder Processing, Polymer Science and Engineering.

During the final two semesters, research and design projects are offered to students, A limited number of innovative open-ended experimental projects are also offered to students by choice, either to help them in setting up small-scale industry or to prepare them for higher education.

The Department is running a five-year dual degree programs leading to both B.Tech. and M.Tech. in Chemical Engineering.

Postgraduate

The Department offers a four-semester (24 months) postgraduate program leading to the degree of M.Tech. in Chemical Engineering.

During the first three semesters, the students complete their course work. The third and fourth semesters are devoted to the research project. The research project starts in the second semester, and it may be experimental or computational or a combination of both.

The Department also offers M.S. (Research) programme in Chemical Engineering. During the first semester the students complete their course work. The following three semesters are devoted to the research project.

There is a provision for joining the M.Tech./MS Programs on part-time basis for persons already employed. Rules and Regulations for such students are given elsewhere in the Prospectus.

Research

The faculty member of the department are actively engaged in conducting basic and applied research leading to the award of Masters and Doctoral Degrees. The faculty is also engaged in carrying out development work on projects sponsored by industries, user organizations and other funding agencies. The projects are directed towards indigenous development and finding solutions to problems in thrust areas of research. Typical among the sponsored projects are development of technology for efficient heat transfer,quality by design based process development for a biosimilar, biomass thermo-chemical conversion, safety and control of runaway reactors, 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, IS process for hydrogen production. The research activities of the department can be classified in the following broad sub-disciplines.

Agro Technology : Coating of urea prills with neem oil, oil extraction from jojoba seeds, design of silos and cyclones, separation of bitters from fruit juices, application of CO_2 for storage of grains, use of fluidised beds for drying, supercritical extraction of neem oil, modeling of drying processes, use of ethanol in alkaline fuel cell, Hydrogen from Biomass, Crop-protection strategies.

Bioseparations and Bioprocessing: Quality by design, Biosimilar, Process analytical technology, Multivariate data analysis, Development of novel bioseparations technologies, Process modeling.

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, Unitized regenerative fuel cell, Alkaline fuel cell, Electro catalyst, Membrane electrode assembly development, Development of a sustainable technology for hydrogen production.

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 steal rolling mills and process industries,development of new pollution preventing writing and printing inks, paints, fuels sustainable carbon-capture technologies.

Fluid and Particle Mechanics*:* Characterization of particles, communition and gas-solid separation, flow properties through silos, pneumatic conveying of solids and flow through porous media.

Heterogeneous Catalysis: Preparation, Characterization & Catalytic Studies of various supported transition metal catalysts, metal oxides & zeolites.

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

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, Oil recovery from emulsion effluents, Re-refining of used engine oils, Alternative fuels.

Process Systems Engineering: Planning and scheduling of batch and continuous process operations, Process optimization, Advanced process synthesis, Process plant simulation, Process optimization, Scheduling and planning, Heat-exchanger network synthesis, Water allocation network synthesis, Stochastic optimization techniques, Process control.

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, continuous film contactors, standardization of the use of radioisotopes as nondestructive methods of measurements of reactor hydrodynamics, wetting characteristics of reactor packings, photochemical and photoelectrochemical reactors, IS process technology development.

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 measured data of the membrane separation system. Removal of dye from water using colloidal gas aphrons and reverse micellar extraction, de-bittering of fruit juices for improved shelf life and taste.

Ph.D. Research Areas

Adsorption, Application of Chemical Engineering Principles to Agriculture, Biomass, Catalysis, Development of Biotech Processes, Multivariate Data Analysis, Development of Novel Bioseparation Tools, Hydrocarbon Processing, Chemical Reaction and Reactor Engineering, Dynamics and Control of Batch & Continuous Flow Stirred,Fixed Bed, Reactors, Computer Aided Design, Computational Fluid Dynamics Applications, Dye removal from Waste water, Environmental Engineering, Expert Systems, Fluidization, Fuel Cell Technology, Gas Absorptions with Chemical reaction in Packed Columns, Interfacial Engineering, Enhanced Oil Recovery, Sulphonation of Crude, Ion-Exchange, Membrane Processes, Mixing, Modeling, Particle Technology, Hydrogen Production, Polymers, Production of Nano- Particles through comminution, Residence Time Distribution Studies, Thin film phenomena, Retrofitting of silos from flow characterization of powders, Simulation and Optimization, Waste Management, Foam-bed Reactors, Pollution Preventing Inks, Paints and Fuels, Applications of Nanotechnology in Energy, Environment and Healthcare, Carbon-capture Technologies.

Department of Chemistry

Professor and Head

A. K. Singh, *Ph.D. (Delhi)*	Organometallic Chemistry, Selenium and Tellurium Ligands, Functionalized Polymers and their Applications.

Professors

A. S. Brar, *Ph.D.(IIT/D)*	NMR, Polymer Chemistry.
D. K. Bandyopadhyay, *Ph.D. (I.A.C.S)*	Bioinorganic Chemistry, Metalloporphyrin Catalysis, Kinetics and Mechanistic Studies.
C. Chakravarty, *Ph.D. (Cambridge)*	Theoretical and Physical Chemistry, Quantum & Classical Simulations, Phase Transitions, Water & Hydration, Nanoscale Self-Assembly.
H. M. Chawla, *Ph.D. (Delhi)*	Chemistry of Singlet Oxygen, Supramolecular Chemistry, Molecular Organization and Recognition, Chemical Sensors, Molecular Imprints and Devices.
Anil J. Elias, *Ph.D. (IIT/M)*	Main Group and Organometallic Chemistry, Cyclophosphazenes, Ferrocene and Cobalt Sandwich Compounds.
A. K. Ganguli, *Ph.D. (I.I.Sc., Bangalore)*	Solid State Chemistry of Intermetallic Compounds, Dielectric Materials and Oxide Superconductors, Nanomaterials.
M. N. Gupta, *Ph.D. (I.I.Sc., Bangalore)*	Applied Enzymology.
B. Jayaram, *Ph.D. (City Univ. New York)*	Computer Simulations on Chemical and Biochemical Systems, Bioinformatics, *Insilico* Drug Design.
P. S. Pandey, *Ph.D. (Banaras)*	Bio-organic Chemistry, Supramolecular Chemistry.
R. N. Ram, *Ph.D. (Banaras)*	Synthetic Methodology, Protective Groups, Applications of Metal Ions and Complexes in Organic Synthesis, Free Radicals.
A. Ramanan, *Ph.D. (I.I.Sc)*	Crystal Engineering.
Ravi Shankar, *Ph.D. (Panjab)*	Main Group Metal Chemistry, Organometallic Supramolecular Chemistry, Inorganic Polymers.
J. D. Singh, *Ph.D. (Lucknow)*	Chemistry of Chalcogens/ Organo-Chalcogens and their Applications in Organic Synthesis, Catalysis, Organic Metals and Superconductors, Chemistry of Elusive Nitrogenous Gases in Organo Chalcogen Matrix.

Associate Professors

Sunil Kumar Khare, *Ph.D. (IIT/D)*	Biochemistry, Enzyme Technology, Applied Microbiology.
N.D. Kurur, *Ph.D. (Caltech)*	NMR Methodology.
Siddharth Pandey, *Ph.D. (North Texas)*	Physical Chemistry, Analytical Chemistry, Optical Spectroscopy, Alternate Media.
N. Pant, *Ph.D. (Princeton)*	Theoretical and Experimental Conformational Analysis.
N.G. Ramesh, *Ph.D. (IIT/M)*	Synthetic Organic Chemistry, Carbohydrate Chemistry, Asymmetric Synthesis.

Assistant Professors

Pramit K. Chowdhury, *Ph.D. (Iowa State Univ.)*	Biophysical Chemistry, Conformational Distribution of Peptides and Proteins under Conditions of Macromolecular Crowding Dynamics of Intrinsically Disordered Proteins, Single Molecule Spectroscopy.

Shashank Deep, *Ph.D. (IIT/D)*	Physical and Biophysical Chemistry, Structural and Physico-chemical characterization of Protein-protein Interaction and Protein Stability.
V. Haridas, *Ph.D. (NIST, Trivandrum)*	Bio-organic Chemistry, Chemical Biology of Peptides and Proteins. Biophysics of Peptide/Protein Folding.
S. Nagendran, *Ph.D. (IIT/K)*	Chemistry of Group 13 and 14 Elements with Special Emphasis to the Low-valent Compounds of Silicon.
Sameer Sapra, *Ph.D. (IISc, Bangalore)*	Nanocrystals, Light Emitting Materials, Quantum Dots, Electronic Optical Properties of Nanomaterials.

The Department offers M.Sc., M.Tech. and Ph.D. Programmes in Chemistry and caters to Chemistry courses for B.Tech. students in Engineering disciplines. It provides good opportunities for research at doctoral and post-doctoral 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, winter workshops etc. 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 Programme in Chemistry has many special features making it different from the conventional M.Sc. programmes offered by various universities. The programme 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 to make the training complete. 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. A term paper initiates the students into research work in various branches of Chemistry. Students should obtain a grade of 'D' or above in 90 credits for the award of M.Sc. degree.

M. Tech.

Everything in the environment, whether naturally occurring or man made, is composed of chemicals. Chemistry also plays a dominant role in materials science because it provides information about the structure and composition of materials. One of the goals of applied chemistry and materials science is to learn how to manufacture useful new substances. Towards this end chemists engineer molecules by searching for and using new knowledge about chemicals. The M. Tech. Programme in Molecular Engineering: Chemical Synthesis & Analysis is one-of-a-kind programme in the country and provides advanced training in the design, synthesis, separation, and characterization of molecules 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 in all contemporary areas of the subject. Major disciplines include analytical, inorganic, organic, physical chemistry and biochemistry.

1. Analytical Chemistry: Solvent Extraction and Ion Exchange, Chelating Resins, Ion Selective Electrodes, Spectrophotometric and AAS Methods for Trace Elements, Environmental/Chemical Analysis, Electroanalytical Methods.

2. Biochemistry: Enzyme Stability and Stabilization, Nonaqeous Enzymology, Bioseperation, Peptide Synthesis for Molecular Device Construction, Computer Aided Molecular Design, Genome Annotation, Enzyme Immobilization and Bioconversions, Microbial Biochemistry.

3. Inorganic Chemistry: Organometallic Chemistry of Main Group/Transition Elements, Inorganic Polymers and Supramolecular Chemistry. Metallo porphyrins as Catalysts, Intermetallic Compounds, Chemistry of Materials.

4. Organic Chemistry: Total Synthesis and Synthetic Methods, Transition–Metal Compounds in Organic Synthesis, Synthetic Carbohydrate Chemistry, Peptides, Proteins and other Natural Products, Chemistry of Reactive Intermediates, Chemistry of Singlet Oxygen, Molecular Recognition and Organization, Supramolecular Chemistry, Chemical sensors, Molecular Imprints and Devices, Bioorganic Chemistry, Kinetics and Mechanism of Organic Reactions.

5. Physical Chemistry: Statistical Thermodynamic investigations of Chemical and Biochemical Systems via Computer Simulations, Theoretical Studies on Protein-DNA and Drug-DNA Interactions. Simulation Methods for Quantum Systems, Clusters. Multidimensional NMR Methods in Structure Elucidation of Polymers, Magnetic and Photophysical Properties of Intercalated Materials. Structural and Physico-Chemical Characterization of Protein-protein Interaction and Protein Stability, Understanding Complex Fluidic Systems, Protein Folding and Aggregation using Single Molecule Confocal Microscopy. Optical and Electronic Properties of Nanomaterials.

Laboratory Facilities

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

Department of Civil Engineering

Professor and Head

A.K. Gosain, *Ph.D. (IIT/D)*	Integrated Watershed Modelling, GIS Hydrological Modelling, Irrigation Management, Enviornmental Impact Assessment.

Professors

B. Bhattacharjee, *Ph.D.(IIT/D)*	Durability of Concrete, Rebar Corrosion, Cement based Composites, Construction Technology, Building Science.
Manoj Datta, *Ph.D. (IIT/D)*	Geoenvironment, Landfills, Ash Ponds, Tailings, Ground Improvement, Slope Stability, Dams, Offshore Geotechnology.
N.K. Garg, *Ph.D. (Wales)*	Water Resources System, Finite Element, Watershed Modelling, Irrigation Management, CAD.
Ashok Gupta, *Ph.D.(IIT/D)*	Structural Engineering, Artificial Intelligence, Technology Enhanced Learning.
K. C. Iyer, *Ph.D. (IIT/M)*	Construction Engineering and Management, Contracts and Arbitration, Structural Engineering.
A. K. Jain, *Ph.D. (IIT/D)*	Design of RCC and Steel Structures, Earthquake Engineering, Wind Engineering, Offshore Structures. Dynamic Testing of Structures.
J. M. Kate, *Ph.D. (IIT/B)*	Geotechnical Engineering, Ground Improvement, Expansive Soils, Geophysical Methods, Foundation, Rock Mechanics.
A.K. Keshari, *Ph.D. (IIT/K)*	Groundwater Flow & Pollution Modelling, Remote Sensing & GIS, Hydrology, Optimization & FEM, EIA & Hydrogeological Hazard.
Mukesh Khare, *Ph.D. (New Castle Upon Tyne)*	Air & Vehicular Pollution Modelling, Indoor Air Pollution.
Shashi Mathur, *Ph.D. (Delaware)*	Groundwater Contamination Bioremediation of Soils, Flow through Porous Media, Phyto-remediation, Biodegradation in Landfills.
A.K. Nagpal, *Ph.D. (IIT/D)*	Structural Engineering, Tall Buildings, Bridges, Earthquake Engineering.
K. S. Rao, *Ph.D. (IIT/D)*	Rock Mechanics and Rock Engineering, Geotechnical Engineering, Engineering Geology, Seismic Microzonation.
K. G. Sharma, *Ph.D. (Wales)*	Constitutive Modelling, Dams Underground Structures, Slope Stability, Computational Methods.
S. N. Sinha, *Ph.D. (IIT/D)*	Structural Engineering, Reinforced Concrete and Masonry Structures, Damage Assessment and Strengthening Measures.

Dogra Chair Professor

T.K. Datta, *Ph.D. (IIT/B)*	Structural Engineering, Earthquake Engineering, Wind Engineering, Offshore Dynamics, Structural Control.

Associate Professors

B.J. Alappat, *Ph.D. (IIT/B)*	Environmental Engineering, Solid Waste Management, Incineration, Fluidized Bed Operations.
Gurmail S. Benipal, *Ph.D. (IIT/D)*	Structural Engineering, Nonlinear Elasts Dynamic, Constitutive Modelling, Concrete Mechanics: Creep, Elastoplasticity, Damage.
B.R. Chahar, *Ph.D. (IIT/R)*	Canal Design, Groundwater Modelling and Artificial Recharge, Seepage and Drainage, Stream - Aquifer Interation, Optimization, Numerical Techniques.
K.K. Gupta, *Ph.D. (IIT/D)*	Soil Mechanics, Rock Mechanics, Foundation Engineering, Geosynthetics, Ash Pond, Landfill, Mine Tailings.
Rakesh Khosa, *Ph.D. (IIT/D)*	Water Resources Systems, Stochastic Processes, Conflict Resolution & Hydrologic Modelling of Large River Basin.

Alok Madan, *Ph.D. (SUNY/Buffalo)*	Earthquake Engineering, Nonlinear Structural Dynamics, Concrete Structures, Computing in Structural Engineering, Structural Masonry.
A.K. Mittal, *Ph.D. (IIT/B)*	Environmental Engineering, Management of WAT SAN Utilities, Wastewater Treatment, Urban Water, Emerging Molecules in Environment.
A.K. Nema, *Ph.D. (IIT/B)*	Environmental Engineering, Modelling, Simulation and Optimization of Environmental Systems, Integrated Waste Management, Environmental Impact and Risk Assessment.
G.V. Ramana, *Ph.D. (RPI/NY)*	Geotechnical Earthquake Engineering, Dynamic Site Characterization, Machine Foundations, Environmental Geotechnology, Geosynthetics.
J.T. Shahu, *Ph.D. (IIT/K)*	Geotechnology for Tracks and Pavements, Constitutive Modelling of Soils, Ground Improvement, Geosynthetics.
Geetam Tewari, *Ph.D. (Univ. of Illinois, Chicago)*	Transportation Planning, Public Transport Systems, Non-Motorised Vehicle Planning, Traffic Safety.

Assistant Professors

R. Ayothiraman, *Ph.D. (IIT/M)*	Soil Dynamics and Earthquake Geotechnical Engineering, Pile Foundations, Deep Excavation and Tunnelling in Soft Ground, Problematic Soils and Ground Improvement.
Suresh Bhalla, *Ph.D. (Singapore)*	Structural Mechanics, Structural Health Monitoring, Smart Materials & Structures, Tensegrity Structures, Underground Structures, Bio-mechanics, Green Structures.
S.K. Deb, *Ph.D. (IIT/D)*	Transportation Engineering, Urban Engineering, Fuzzy System Modelling, Airways, Academic Programmes.
Supratic Gupta, *Ph.D.(Nagoya University)*	Structural Engineering, FEM Analysis, Constitute Modelling of Material & Structures, Concrete Mechanics, Self Compacting and High Performance Concrete.
Gazala Habib, *Ph.D. (IIT/B)*	Aerosol Characterization, Climate Effect and Climate Modelling.
K.N. Jha, *Ph.D. (IIT/D)*	Construction Project Management, Project Success Factors, Schedule-Cost Estimation, Computer Applications in Project Management.
D.R. Kaushal, *Ph.D. (IIT/D)*	Hydraulic and Water Resources Engineering, Computational Fluid Dynamics, Sediment Transport, Hydraulic Structures, Slurry Pipeline, Flow Instrumentation.
J. Uma Maheshwari, *Ph.D. (IIT/M)*	Conustruction Project Management, Automation in Design and Construction, Planning for Fast-track and Concurrent Engineering Projects, Quantitative Techniques in Construction Management.
Vasant Matsagar, *Ph.D. (IIT/B)*	Structural Engineering, Earthquake and Wind Engineering, Off shore Structures, Fiber Reinforced Polymer Composites, Finite Element Analysis, Blast & Fire Engineering.
Kalaga R. Rao, *Ph.D. (IIT/Kgp)*	Mass Transit Planning, Traffic Flow Modelling and Travel Demand Modelling.

Senior Scientific Officer-II

H.S. Gupta, *Ph.D. (Bhopal)*	Mathematical Modelling - Hydrology and Water Resources Engineering.

Senior Programmer

M.M. Rao, *Ph.D. (IIT/D)*	ANN Control of Building Frames, MIS, System Administration, Development of Application Software.

Academic Programmes

The Department offers programmes leading to the award of B.Tech., M.Tech., M.S. (Research) and Ph.D. degrees. The Department also registers M.Tech. and Ph.D. candidates under Quality Improvement Programme from sister institutions. Under its Continuing Education Programme, it organizes from time to time, advanced special courses as well as short-term refresher courses, both for academic and serving senior level officers in Central and State Government and Public Sector Undertakings.

The Department actively promotes curriculum development activity by updating existing courses, developing new courses and preparing resource material for teaching.

The Department has a number of ongoing research projects and sponsored research schemes from public and private sector organizations. It undertakes industrial consultancy work as a part of its interaction with industry and also organizes seminars/symposia for professional interaction.

The Department contribute to the interdisciplinary academic and research activity of the Institute.

Undergraduate

The undergraduate curriculum is broad-based and is designed to introduce the students to the wide range of problems encountered by civil engineers. Elective courses as well as independently conducted projects enable students to develop additional depth in areas of special interest to them. Practical training followed by a colloquium as part of the curriculum helps to give students a feel of field problems; field trips on studies of geological formations also form a part of the curriculum. 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 will 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 & Management,
- Environmental Engineering & Management,
- Geotechnical & Geoenvironmental Engineering,
- Rock Engineering and Underground Structures,
- Structural Engineering,
- Water Resources Engineering,
- Transportation Engineering,
- Construction Technology and Management (Industry Sponsored).

Apart from this, we also offer a one year PG Diploma in Metro Rail Transport : Technology and Management (Industry Sponsored).

Research

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

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

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

3. *Environmental Engineering :* Water Distribution Systems, Water and Wastewater Treatment and Disposal, Urban Water, Water Quality Modelling, Air Quality (Vehicular/Ambient), Wind Tunnel, Simulation Modelling of

Air Pollution, Indoor Air Quality Modelling, Incineration, Solid Waste Management, Fluidized Bed Operations, Landfilling, Environmental Risk and Impact Assessment, Simulation and Optimization of Environmental Systems.

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

5. *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.

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

7. *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-Structures Interaction; Reinforced Soil Structures; Geosynthetics; Marine Geotechnology, Environmental Geotechnology, Ground Improvement, Geotechnical Earthquake Engineering, Seismic Microzonation, Geotechnology related to Roads and Railway Tracks.

8. *Structural Engineering:* Tall Buildings, Bridges, Offshore Structures, Dynamic Analysis of Structures, Seismic Analysis, Dynamic Soil-Structure Interaction, Wind Induced Vibrations, Fluid-Structure Interaction, Structural Control, Artificial Intelligence, Neural Networks, Composite and RC Columns, Masonry and RC Structures, Constitutive Modelling, Creep, Elast oplasticity and Damage of Concrete, Use of Expansive Ingradients & Fly Ash in Concrete, Self-compacting and High Performance Concrete, Fiber Reinforced Polymer (FRP) Composites, Prestressed Concrete Structures, Fire Behavior of Structures, Blast Resisting Structures.

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

10. *Transportation Engineering:* Traffic Engineering and Management, Traffic Flow Modelling, Mass Transit, Transportation System Analysis, Urban and Regional Transportation Systems Planning, Co- ordinated Urban Mass Transit Network Planning and Evaluation, Bus Rapid Transit System Design and Planning, Accident Prediction Modelling, Geosynthetics for Roads, Planning of Bicycle Network and Infrastructure Traffic Safety, Analysis of Stresses and Evaluation of Pavement Materials under Repeated Loading, Highway and Airfield Pavements, Pavement Drainage, Economic Analysis and Evaluation of High-way Schemes, Fuzzy Modelling, Airport Engineering, Air Pollution.

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

Laboratory Facilities

Structural Engineering Laboratories is a cluster of nine 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. This laboratory cluster has facilities to test material strength and prototype structures. Some of the key equipment includes strain controlled dynamic

compression testing machine (4000KN), 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. 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 a Pentium server and 30 pentium systems and 4 SUN Indy workstation. All the equipment are on Local Area Network. The LAN has capacity of 50 nodes. The laboratory is equipped with some of the latest softwares viz: network version of STAAD III, SAP STARDYN, GT-STRUDL, STRAP FORTRAN and Microstation PC. The laboratory also has a separate projection room for conducting computer-aided tutorial classes.

Soil Mechanics Laboratory has facilities for testing soils under generalised stress-strain conditions (universal triaxial cell), under high confining pressures (up to 1400 Kg/cm^2), 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 40t. 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, etc.

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 (500t vertical load, 100 t 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/cm^2), triaxial (200 Kg/cm^2), 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 & 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.

Environmental Engineering Laboratory is equipped to examine water and wastewater chemically, physically, bacteriological and biologically. Filtration columns, pilot scale rotating biological contactors, mini ion exchange plant, 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 Analyzed digital gas liquid chromatograph, digital electronic ion analyser, flame photometer, TOC Analyzed digital balance, digital microprocessor based DO and Ion meter, digital pH controller, indoor air quality monitor, air velocity meter, handy air samplers, respirable dust monitors, Stack monitoring kit, Bomb calorimeter and many other allied analytical equipments for analysis of water/wastewater/air/organics/inorganics/metals etc.

Surveying and Remote Sensing Laboratory is equipped with precise survey instruments for field surveying (land survey, underground survey, offshore positioning etc.). 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 15 Pentium systems. All the equipments are on LAN facilities for satellite image processing digitization and scanning. Application software dealing with GIS (ARC/INFO) and Expert System (LEVEL 5 OBJECT). Experimental facilities include the advanced Hydrologic System Hydraulic work Bench, Spectrophotometer: lon Meter and other instruments for carrying out a detailed water quality analysis. River Hydraulics Facility enables model studies; sediment transport analysis, dam break and flood wave propagation studies.

Ph.D. Research Areas

Structural Dynamics, 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, Nonlinear Elastodynamics of Concrete Beams, Rebar Band Modelling, Self Compacting and High Performance Concrete, Structural Health Monitoring, Smart 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 in Wastewater treatment, Urban Water, Hazardous Water Management, Water quality modelling, Solid water disposal, Indoor air pollution and modelling, Vehicles Pollution Modelling, Circulating Fluidized Bed Operation, Colour Removal, Thermal performance of buildings and Energy efficient building design. Construction Management, Systems Engineering and Design, Highway and Transportation Engineering, Urban Transportation and Environmental system Engineering, Airport Engineering, Fuzzy Modelling, Environmental Impact Assessment of Transportation and Urban Environment, Mathematical Modelling in Water Resources, Flood Forecasting, Statistical Modelling in Hydrology, Water Resources Projects, 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 Application in Water Resources Modelling; Morphotectonic and Geological Studies, Natural Hazards such as Land Slides, Coastal Erosion etc. and Environmental Monitoring, Pattern Recognition in Remote Sensed Data Analysis, Digital Terrain Modelling and Computer Applications and Photogrammetry.

Department of Computer Science and Engineering

Professor and Head

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

Professors

M. Balakrishnan, *Ph.D. (IIT/D)*	CAD of VLSI, Computer Architecture.
Subhashis Banerjee, *Ph.D. (IISc., Bangalore)*	Computational Vision, Real Time Systems.
K.K. Biswas, *Ph.D.(IIT/D)*	Computer Vision, AI.
Naveen Garg, *Ph.D. (IIT/D)*	Algorithms, Optimization.
S.K. Gupta, *Ph.D. (IIT/D)*	Graph Theory, Computer Vision, Databases.
B.N. Jain, *Ph.D. (Stony Brook)*	Computer Networking, Information Systems, Multi Media Communications.
Pankaj Jalote, *Ph.D. (Univ. of Illinois)*	Software Engineering, Fault-tolerance, Distributed Systems.
Prem Kalra, *Ph.D.(EPFL, Switzerland)*	Computer Graphics, 3D Animation.
Saroj Kaushik, *Ph.D.(IIT/D)*	Natural Language Processing, Artificial Intelligence, Knowledge Based Systems.
Anshul Kumar, *Ph.D. (IIT Delhi)*	CAD of VLSI, Computer Architecture.
S. Arun Kumar, *Ph.D. (TIFR, Bombay)*	Semantics and Verification.
S.N. Maheshwari, *Ph.D. (Northwestern)*	Algorithms, Parallel Processing, Information Systems.
Sanjiva Prasad, *Ph.D. (Stony Brook)*	Programming Languages, Concurrency, Semantics.
Huzur Saran, *Ph.D. (UC Berkeley)*	High Speed Networks, Graph Theory & Algorithms.

Associate Professors

Amit Kumar, *Ph.D. (Cornell)*	Algorithms and Network Design.
Subodh Kumar, *Ph.D. (UNC,Chapel Hill)*	Computer Graphics, Virtual Reality, Visualization, Geometry Modelling.
Preeti Ranjan Panda, *Ph.D. (UC Irvine)*	Embedded Systems Design, Memory Synthesis and Optimization.

Assistant Professors

Amitabha Bagchi, *Ph.D. (John Hopkins)*	Algorithms, Data Structures, Theory of Networks.
Sorav Bansal, *Ph.D. (Stanford)*	System, Security, Cloud Computing.
Ragesh Jaiswal, *Ph.D. (UC San Diego)*	Complexity, Randomized Algorithms, Cryptography.
Niloy J. Mitra, *Ph.D. (Stanford Univ.)*	Computer Graphics, Visualization, Geometry.
Kolin Paul, *Ph.D. (REC, Kolkata)*	Reconfigurable Computing, Embedded Systems.
Vinay Ribeiro, *Ph.D. (Rice University)*	Computer Networks.
Aaditeshwar Seth, *Ph.D. (Waterloo)*	Networks ICTD, Social Networks.

Visiting Faculty

Daya Gaur, *Ph.D. (Simon France)*	Approximation Algorithms, Algorithms in Bioinformatics, Scheduling and Facility Location, Discrete and Combinatorial Optimization.
Anupam Joshi, *Ph.D. (Purdue Univ.)*	Mobile & Pervasive Computing, Semantic & Social Web.

Adjunct Faculty

Arzad Alam Kherani, *Ph.D. (IISc., Bangalore)*	Computer Networks, Performance Modelling.
Alfeiya Hussain, *Ph.D. (Univ. of South California)*	Computer Networks.
Manik Verma, *D.Phil. (Oxford Univ.)*	Computer Vision and Machine Learning.

The department currently has 25 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 Programmes

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. 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) where approximately 3,20,000 high school graduates 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 examination 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 in the curricula is on system architecture, algorithms, networking, performance issues, and tools for applications development. The stress is more on design, methodology, analysis, and good software practices. As part of graduation requirements, each 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.

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 Network.
- Vision Based Graphics.
- Video Compression.
- Parallel Scientific Computation.
- Application Specific multi-processor SOC Design.
- Design Methodology for Embedded Realtime Systems.
- Network and OS support for Multimedia Communications.
- Network and Enterprise Security.
- QoS issues in High-speed Networks.
- Data Mining.
- Information Security.
- Wireless Network Architecture.
- Dynamic and Static approaches for Software Checking.
- Software Oriented Architecture and Web Services.
- Software Verification.

Research Areas

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 and Kolin Paul).

(Website: http://www.cse.iitd.ac.in/esproject)

Artificial Intelligence: Blackboard architecture, expert systems, natural language processing, machine learning, parallel heuristic search (associated faculty: Dr. Saroj Kaushik and K.K. Biswas).

Vision and Graphics: 2D and 3D object recognition, real-time motion tracking, image compression, image based geometric modelling, 3D graphics and animation (associated faculty: Subhashis Banerjee, Prem Kalra, Subodh kumar and Niloy Mitra).

(Website: http://www.cse.iitd.ac.in/vglab).

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

Software Systems: Object-oriented information systems, GIS, dictionary management and concurrency control in databases, Data mining, multi-databases systems, indexing techniques and file system design, and design and implementation of programming languages. (associated faculty: S.K. Gupta, S. Arun Kumar, Sanjiva Prasad and Pankaj Jalote).

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 and Amitabh Bagchi and Ragesh Jaiswal).

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 mbps links. The departmental network is connected to the Institute-wide network through a 1Gpbs switched fiber optic line. There is a 100 Mbps link to the outside world.

Laboratories

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.

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.

Advanced Networking Laboratories

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 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 Synposys) 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 coprocessor 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.

Current and Future Directions

The department is working towards (i) modernising its existing laboratories consistent with changes in hardware and software technology, (ii) attracting and retaining quality faculty, (iii) arranging and offering enhanced fellowships in postgraduate programmes, and (iv) seeking industry and government support for research and development projects.

An industry sponsored M.Tech. Programme, in VLSI Design Tools and Technology is offered jointly with Department of Electrical Engineering and CARE. Enhanced fellowships funded by IBM, CISCO, Microsoft, Bell Labs India and Infosys are available for the postgraduate students. Additional support is available from various sponsored R&D projects funded by Government sources.

Ph.D. Research Areas

Parallel and Distributed computing, Application specific processor synthesis, Hardware-software codesign, High level synthesis of ASICs, Semantics, Verification, Computer vision, Image processing and Pattern recognition, Knowledge-based systems, Approximation algorithms, Databases and Data mining, Information security, Graph theory and algorithms, Randomized algorithms, Computational geometry, High speed networks, Network based information systems, Multimedia communication, Wireless networks, Network security, Computer graphics, 3D Animation, Virtual reality, Visualization, Combinatorial optimization, Natural language processing, Web services and SOA, Software architecture evaluation, Dynamic and static approaches to program checking.

Department of Electrical Engineering

Professor and Head

R. K. Patney, *Ph.D. (IIT/D)*	Digital Signal Processing.

Emeritus Fellows/INSA Honorary Scientist

M. L. Kothari, *(Power Grid Chair), Ph.D. (IIT/D)*	Power Systems Control, Stability Protection, FACTS, Neural Networks and Fuzzy Logic Systems.
J. Nanda, *Ph.D. (Moscow)*	Power Systems Planning, Analysis, Stability, Optimization, Computer Control, Energy Conservation, Application of Neural Networks and Parallel Computing to Power Systems.
S. C. Dutta Roy, *D.Phil. (Calcutta)*	Passive and Active Network Synthesis, Solid State Circuits, Distributed Networks, Digital Signal Processing.
B. P. Singh, *Ph.D. (IIT/D)*	Electric Machine Analysis and Design, Control of Drives & Energy Conservation.

Professors

R. K. P. Bhatt, *Ph.D. (IIT/D)*	Adaptive Control, Nonlinear Dynamics, Image Processing.
B. Bhaumik, *Ph.D. (IIT/K)*	Modeling Visual Pathway in Brain, Analog and Mixed Signal VLSI Circuits.
P. R. Bijwe, *Ph.D. (IIT/D)*	Power Systems Analysis and Optimization, Distribution Systems, Analysis & Optimization.
R. Bose, *Ph.D. (Pennsylvania)*	Wireless Communication, Information Theory, Error Control Coding.
D. Chadha, *Ph.D. (IIT/D)*	Optical Communication and Networks, Photonics, Microwave, Electromagnetics.
V. Chandra, *Ph.D. (IIT/D)*	Communication Systems, Fault Tolerant Computing Systems, Optical Communication.
J. K. Chatterjee, *Ph.D. (Bristol)*	Electric Machines, Power Electronics and Electric Drives, Applications of DSP & Microcontroller.
S. Chaudhury, *Ph.D. (IIT/Kgp.), (Schlumberger Chair)*	Computer Vision, Multimedia Systems, Computational Intelligence.
M. Gopal, *Ph.D. (BITS)*	Machine Learning, Soft Computing, Pattern Recognition, Intelligent Control.
H. M. Gupta, *Ph.D. (IIT/K)*	Communication Systems, Computer Communications, Photonic Systems, Multimedia Information Systems.
M. Hanmandlu, *Ph.D. (IIT/D)*	Soft Computing, Image Processing, Computer Vision, Pattern Recognition, Biometrics, Medical Imaging, Surveillance, Intelligent Control.
V. K. Jain, *Ph.D. (IIT/D)*	Digital Communication, Optical Communication & Networks.
Jayadeva, *Ph.D. (IIT/D)*	Machine Learning, Neuromorphic Engineering, VLSI Design, Optimization.
S. D. Joshi, *Ph.D. (IIT/D)*	Statistical Signal Processing, Image Processing, Multiresolution Signal/Image Analysis.
S. Kar, *Ph.D. (IISc., Bangalore)*	Photonic Switching, Optical Networks, Computer Communication Networks, Telecom Networks Protocol Engineering, Embedded Systems.
M. J. Kumar, *Ph.D. (IIT/M)*	Nanoelectronics, VLSI Device Modeling and Simulation, (Semiconductor Power Devices).
R. K. Mallik, *Ph.D. (S.California), (Jai Gupta Chair)*	Communication Theory & Systems, Difference Equations, Linear Algebra.

S.S. Murthy, *Ph.D. (IIT/D)*	Electric Machines, Drives, Power Electronics Applications, Energy Conservation, Renewable Energy Systems.
S. Prasad, *Ph.D. (IIT/D)*	Signal Processing and Communication, Radar, Sonar, Speech and Image Processing.
K. R. Rajagopal, *Ph.D. (IIT/D)*	Electrical Machines, Drives, Power Electronics, PM Brushless DC, Switched Reluctance, Stepper and Hysteresis Motors, High Efficiency Induction Motors, FE Analysis & CAD, Magnetic Bearing, Motor Controllers, Electric Vehicles, Domestic Appliances.
Bhim Singh, *Ph.D (IIT/D), (ABB Chair)*	Power Electronics, Electrical Machines and Drives, HVDC, FACTS, Power Quality, Renewable Energy, DSP based Control of Power Converter and Drive.
G.S. Visweswaran, *Ph.D. (IIT/K)*	CAD of VLSI, Design of Digital, Analog and Mixed Signal VLSI Circuits.
I.N. Kar, *Ph.D. (IIT/K)*	Robust Control, Mechatronics, System Identification, Intelligent Control, Non-linear Systems.

Associate Professors

G. Bhuvaneshwari, *Ph.D. (IIT/M)*	Power Electronics, Electrical Machines & Drives, Power Quality.
S. Prakriya, *Ph.D. (Toronto)*	Signal Processing for Communications, Cooperative links, Cognitive Radio.
Sumantra Dutta Roy, *Ph.D. (IIT/D)*	Computer Vision and Image Analysis, Music Information Retrieval, Bioinformatics.
M. Veerachary, *Dr. Eng.(Japan)*	Power Electronics, High Frequency Switch-Mode Power Conversion, Fuzzy-Neuro Controllers for PE Systems, DSP based Controllers, Object Oriented Modeling of PE Systems, Development of MPPT Controllers for Space/Photovoltaic Sources, Photovoltaic Power Conversion, Intelligent Controllers for VRM's. Digital Control Theory Applications.
S. Mishra, *Ph.D. (Sambalpur Univ.)*	Power System Engineering, Intelligent Techniques for Control of Power System and Power Quality Studies, Renewable Energy.

Assistant Professors

Manav Bhatnagar, *Ph.D. (IIT/D)*	Signal Processing for MIMO Communication Systems, Cooperative Communications, Ultra Wideband (UWB) Communications, Non-Coherent Decoders, Cognitive Networks, Coding Theory of MIMO Communication Systems.
Shouribrata Chatterjee, *Ph.D. (Columbia Univ.)*	Analog, Mixed - Signal and RF Integrated Circuits.
Swades De, *Ph.D., (State Univ. of New York)*	Wireless Communication Networks and Systems, Broadband Access Techniques, Performance Modeling and Analysis.
S. Janardhanan, *Ph.D. (IIT/B)*	Discrete-time Systems, Sliding Mode Control, Robust Control.
U. Kumar, *Ph.D. (IIT/D)*	Chaotic Dynamics.
Brejesh Lall, *Ph.D. (IIT/D)*	Multiscale Modeling of Stochastic Processing, Wide Scale Cyclostationary Process Representation, Physical Layer in Wireless Communication.
Mashuq-un-Nabi, *Ph.D. (IIT/B)*	Control Systems, Guidance & Control, Computational Methods for Modeling, Simulation and Control, Finite Element Method, Distributed Parameter Systems, Flexible Structures, Electromagnetic & Coupled Systems, Electromagnetic NDT.
B. K. Panigrahi, *Ph.D. (Sambalpur Univ.)*	Power Quality, FACTS Device, Power System Protection, AI Application to Power System.
Nilanjan Senroy, *Ph.D. (Arizona State Univ.)*	Power System Stability and Control, Wide Area Measurement and Control, Statistical Techniques in Power Systems, Power Quality.

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 anticipated needs of technical manpower in the fast expanding fields of Communications,Computers, Control, Electronics and Power Engineering. The Department awards B.Tech., M.Tech., M.S. (Research), and Ph.D. degrees.
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 is interacting with ministries and departments of the Government of India dealing with human resource development, science & technology, information technology, defence, space, atomic energy, railways, power, non-conventional energy, coal & mines, and petroleum.

The department has professorial chairs Instituted by Philips, Dr. J.N. Gupta, Central Electricity Authority, National Thermal Power Corporation, the Power Grid Corporation of India, and the Schlumberger Corporation. Apart from fundamental research, departmental faculties are actively engaged in sponsored research projects funded by several external agencies, often involving a close interaction with industries. Major funding agencies for these projects include the Ministry of Human Resource Development, the Department of Science & Technology, and the Ministry of Defence, the All India Council for Technical Education, the Defence Research & Development Organization, the Council for Scientific & Industrial Research, the Ministry of Information Technology and the Indian National Science Academy. Major projects currently being funded lie in the areas of microhydel power generation, power system stability, permanent magnet motor drives, wind diesel systems, voltage stability analysis, geographical information systems based support system, active vision, high speed optical communication, telematics, fibre optic LAN, schottky rectifiers, high electron mobility transistors, neural networks and electronic product flow management.

The faculty publish regularly in reputed international and national journals and conferences. Several patents and technical reports have also resulted from such research activity. A number of national and international awards and distinctions have been conferred on departmental faculty members for their outstanding contributions.

The departmental faculty is constantly engaged in curriculum development, continuing education programmes, development of teaching aids, organization of national and international conferences, seminars, workshops, software and laboratory development, activities of professional societies such as the IE, IETE, ISTE, IEE, and IEEE; national mission projects, technical and professional advice to Government and policy making bodies and delivering expert lectures. These activities are often specially geared to the needs of the industry, government and non-government agencies and defence organizations. The department participates in exchange programmes with several reputed foreign universities. As part of its curriculum development activities, the department strives to keep the curriculum and the various courses up-to-date, so that these reflect current developments. Several video courses have been produced by the faculty with support from the Educational Technology Services Centre.

The department interacts actively 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, 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. Faculty from these and other centres and departments are involved in teaching department courses. Department courses are heavily subscribed by students from several centres and departments in the Institute.

Programmes Offered

Undergraduate

The Department offers the following programmes, viz.

1. B.Tech. in Electrical Engineering.
2. B.Tech. in Electrical Engineering (Power).
3. Dual Degree Programme with B.Tech. in Electrical Engineering and M.Tech. in Information and Communication Technology.

The 5-year dual degree programme has been operational since the year 2000 and trains students in broad disciplines in electrical engineering with limited specialization during the last three semesters in information and communication technology.

Both B.Tech. programmes have duration of four years covering eight semesters. The programmes together cover all important areas in Electrical Engineering, including Communications, Computer, Control, Instrumentation, Electronics, Integrated Circuits, Power Electronics, Electrical Machines, Drives, and Power Systems. About 65% of the courses are common to both the programmes. For the B.Tech programme in Electrical Engineering, courses in the first two semesters cover basic sciences and fundamentals of engineering, in order to broaden the student's knowledge in fields allied to Electrical Engineering and to prepare them to take Electrical Engineering courses in subsequent semesters. The Department also offers a compulsory course to first year students, which introduces them to Department and to the discipline of Electrical Engineering. During the next four semesters, the students take a set of department core subjects covering all areas of Electrical Engineering. Starting from the fifth semester, students can register for elective subjects of their choice. For some electives, students are required to make a choice of one the following streams: 1) Information and Communication Technology, 2) Integrated Electronics and Circuits, 3) Control and Automation Engineering, and 4) Power, Machines and Power Electronics. This leads to limited specialization in the area. The choice of core courses and electives in the B.Tech. (Power) programme is intended to train manpower for the Power and Energy sectors. In the final year, students are required to work on a project under faculty supervision. Students undertake a practical training of sixty days' duration in an industrial establishment and also travel to industries in the country as a part of their overall engineering education. Third year students also register for courses on professional practice and colloquium, in order to familiarize themselves with the latest trends in Electrical Engineering and to gain experience in making presentations and participating in discussions.

Postgraduate

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

(i) M.Tech.

In addition to the dual degree programme listed earlier, the department offers six postgraduate programmes leading to M.Tech. degree:

1. Communications and Radar.
2. Computer Technology.
3. Control & Automation.
4. Integrated Electronics & Circuits.
5. Power Systems.
6. Power Electronics, Machines & Drives.

In addition, the Department jointly conducts the following interdisciplinary M.Tech programmes:

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

All M.Tech. programmes are of four semester duration and the students undertake a major project during their 3rd and 4th semesters with a view to making a significant technology development contribution in their areas of specialization.

Industry Sponsored M.Tech. Programmes

Special mention may be made of the following M.Tech Programmes supported or sponsored by relevant Industries and organization.

Opto-Electronics and Optical Communication

The interdisciplinary Optoelectronics and Optical Communication Engineering programme offers a four semester M.Tech. programme in Optoelectronics and Optical Communication as well R&D in the field of Fiber & Integrated Optics and Optical Communications & Networks.

It has received significant funding from agencies like MHRD, OPTEL Telecom and Indian Railways.

VLSI Design, Tools and Technology (VDTT)

The VLSI programme runs jointly with the Computer Science and Engineering Department and the Centre for Applied Research in Electronics. The programme is funded entirely by VLSI industries, and has led to the creation of the Philips Laboratory and the VLSI Physical Design Laboratory. These laboratories house several workstations and computing platforms with several commercial and public domain CAD software.

Power Generation Technology

This is totally sponsored by the National Thermal Power Corporation (NTPC) and is jointly operated by the Electrical and Mechanical Engineering Departments. The NTPC has also Instituted Professorial Chairs in these departments. Engineers sponsored by the NTPC undertake relevant projects in the area of power generation with active support from different NTPC units. The funding provided by the NTPC is also used to modernize relevant laboratories with the latest equipment, computers and software.

Construction Technology

This programme is totally sponsored by Larsen & Turbo Ltd. and is jointly operated by the Civil, Electrical, and Mechanical Engineering Departments.

The Department is responsible for training the candidates in electrical aspects of construction technology, such as distribution systems, motor drives, power equipment, energy, and instrumentation. The students take up projects relevant to these aspects, which are in areas of electrical engineering and undertake practical training in relevant sites.

Telecom Technology and Management

The communications group of the Department is a major constituent of the newly established Bharti School of Telecommunication Technology and Management. The school offers M.Tech (Telecommunication Technology and Management) and M.B.A (with focus on Telecom Systems Management). The curriculum in both these programmes is oriented towards the telecommunication sector. The school will emphasize teaching, training, research, and development on telecommunication switching and networks, optical communication and networks, wireless and mobile communication software, and the operations, planning, policy issues, and management of telecommunication systems.

(ii) M.S. (Research) Programme

The M.S. (Research) programme is appropriate for those wishing to pursue a career in research and development in industry or for those pursuing a career in higher learning. Unlike M.Tech. students they are required to do a longer research project and are required to credit less number of courses.

(iii) Ph.D. Programme

The Department offers Ph.D. programme and M.S. (Research) programmes with a view to push the frontiers of knowledge and exploring new and emerging areas. Teachers in engineering colleges are particularly encouraged to enroll for the Ph.D. programme.

After completion of these programmes, the students find placement in several sectors –Government, Private, R&D, Education, Multinational corporations.

Research Groups

The postgraduate and research programmes in different areas in the Department are coordinated by different research groups. These groups also represent a broad classification of the research interests of the faculty.

Different research areas covered by these groups are given below.

Communication Engineering Group :

Communication Systems, Optical Communications, Communication Networks, Wireless Communications, Signal Processing, Speech and Image Processing, Information Theory and Coding, Microwave Integrated Circuits, Antennas, and Integrated Optics.

Computer Technology Group:

Computer Vision, Multimedia Systems, Image Processing, Computer Networks, Computer Architecture, Embedded Systems, Parallel Computation, Neural Computation, Pattern Recognitions, Artificial Intelligence and Information Technology, Music Information Retrieval, Bioinformatics.

Control Engineering Group:

Robust Control, Intelligent Control, Robotics, Optimal Control, System Identification, Nonlinear Systems & Control, Flight Control & Navigation, Numerical Modeling & Simulation, Embedded Control Systems.

Integrated Electronics & Circuits Group:

Circuits, Devices and Systems, VLSI Design and CAD, Testing and Fault Diagnosis,Fault-tolerant Design, Microelectronics, Digital Signal Processing, Neural Networks, Pattern Recognition, Biological Neural Networks for Vision, Information Technology, Chaos, Microprocessors, Instrumentation Computational Neuroscience and Analog VLSI Design.

Power Engineering Group:

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

Department Facilities

The Department maintains a library, a departmental workshop, and an ergonomically designed committee room. 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 & 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 & Drives, Power Systems, Power Electronics, VLSI Design, Electrical Energy Audit and Energy Conservation, Electrical Machines, and Energy Instrumentation. All laboratories are linked to the Institute LAN and the Internet through 100 Mbps links. In addition, all faculty rooms are also connected through 10Mbps links. Apart from access to a large number of high speed workstations in the Computer Services Centre and in other central facilities, the department has a number of SUN, SGI, DEC Alpha and other workstations and multimedia stations. These systems house a large number of public domain and commercial software packages for VLSI design and simulation, multimedia, digital signal processing, design and simulation of communication systems, control and instrumentation, robotics and automation, power system simulation, electro-magnetics, electrical machine design and simulation and finite element based analysis, among others. Some of the laboratories have been set up with support from national and trans-national corporations and government agencies.

The department has access to VLSI fabrication facilities at MOSIS in the USA through a MoU, which enables realization of prototype designs in near state-of-the art technologies. The department is also currently involved in Energy Audit and Conversation, VLSI, and Fibre optics.

Telematics Programme

The Telematics Programme has been established at the Institute through direct funding by the Ministry of Human Resource Development and is a major thrust area programme, whose objectives include manpower training through short-term continuing education courses, undertaking R&D and consultancy projects in Telematics, and the

mordernization of ongoing undergraduate and postgraduate education in the areas of Communication Engineering. Modern laboratory facilities have been set up to fulfil these objectives. Some of the areas in which intensive work is going on are secure communications, highspeed modems, speech coding for telephone and mobile channels,image processing, channel codecs digital radios, communication networks, optical networks and wireless antennas. Several initiatives taken up under the programme have led to the development of video packages, laboratory kits and other instructional material in the area of telematics.

Energy Audit and Energy Conservation Facility

A state-of-the art energy audit and energy conservation facility has been established in the Department. It contains facilities for Energy Instrumentation, Energy converter and Drive test, Computerised motor test, and CAD software packages for Electrical Machines, Power Electronics, Drives and Power Systems. Apart from enabling energy audit in an Industrial and Commercial environment, the facility can also be used for teaching, continuing education, R&D and design towards overall Electrical Energy Conservation.

Ph.D. Research Areas

(i) **Communication Engineering:** Signal Processing, Speech and Image Processing, Coding & Information Theory, Communication Systems, Optoelectronics, Optical Communications, Communication Networks, Wireless and Mobile Communications Microwaves, Antennas.

(ii) **Computer Engineering:** Computer Vision, Multimedia Systems, Image Processing, Computer Networks, Computer Architecture, Embedded Systems, Parallel Computation, Neural Computation, Pattern Recognition, Artificial Intelligence, Information Technology.

(iii) **Control Engineering:** Robust Control, Robotics, Optimal Control, System Identification, Neuro-Fuzzy Control, Reinforcement Learning Control, Nonlinear Dynamics & Chaos, Adaptive Control, Cooperative Control & Path Planning, Sensor Fusion, Guidance, Navigation and Flight Control, Sliding Mode Control, Interval Analysis in Control Design, Computational Methods for Simulation & Control, Modeling & model order reduction, Attitude Control and Structural Control.

(iv) **Integrated Electronics and Circuits:** Electronics Circuits, Micro-electronics, Nano-Electronics, VLSI Design, Digital Signal Processing, Computer Aided Circuit Design, Graph Theory, Neural Networks, Biological Neural Network for Vision, Testing and Fault Diagnosis, Fault-tolerant Design.

(v) **Power Engineering:** Electrical Machines, Energy Conversion, Power Electronics, Power Quality, Drives, Power & Energy Systems, Protection, Stability, Optimization, Energy Conservation, HVDC & FACTS, Computer Applications in Power (ANN Fuzzy Logic & Expert Systems, Microprocessor/ Microcomputer Control, CAD Software & Applications), Renewable Energy Systems (Small Hydro, PV, Wind), Energy Audit & Efficiency.

Department of Humanities and Social Sciences

Professor and Head

Amrit Srinivasan, *Ph.D. (Cambridge Univ.)*	Sociology of Knowledge & Culture.

Professors

Rukmini Bhaya Nair, *Ph.D. (Cambridge Univ.)*	Linguistics, Philosophy of Language, Cognitive Science and Cultural Studies, Critical Theory, Postcolonialism, Gender, Creative Writing, Narratology.
Bijoy H. Boruah, *Ph.D. (Guelph Univ., Canada) (Visiting Professor)*	Philosophical Aesthetics, Philosophy of Mind, Ethics and Value Theory.
Ravinder Kaur, *Ph.D. (Delhi Univ.)*	Sociological Theory, Sociology of Development, Gender, Environment, Sociology of India, Affirmative Action.
Amulya Khurana, *Ph.D. (IIT/D)*	Organizational Behaviour, Educational Psychology, Positive Psychology, Cyber Psychology, Cognition.
Ambuj D. Sagar, *Ph.D. (MIT)*	Energy & Environment Policy, Energy Innovation Policy, Climate Change Policy, S&T Policy Technology & Development.
Sanil V., *Ph.D. (IIT/K)*	Phenomenology, Hermeneutics, Philosophy of Social Sciences, Aesthetics, Film & Media, Continental Philosophy, Hermeneutics, Art & Technology.
Amrit Srinivasan, *Ph.D. (Cambridge Univ.)*	Sociology of Knowledge & Culture.
V. Upadhyay, *Ph.D. (McMaster Univ.)*	Development Economics, Economic Theory, Indian Economy.

Associate Professors

Purnima Singh, *Ph.D. (Allahabad Univ.)*	Social Psychology,Organisational Behaviour, Health and Environmental Contemporary Social Issues, Organisational Justice, Identity and Collective Experience, Inter Group Relations.
C. A. Tomy, *Ph.D. (Univ. of Hyderabad)*	Philosophy of Mind and Cognition, Philosophy of Science, Scepticism, Metaphysics and Modality.

Assistant Professors

Vibha Arora, *Ph.D. (Oxford Univ.)*	Political Culture, Environment, Globalization, Visual Anthropology, Medical Anthropology, Gender Development, Sociological Theroy, Sociology of South Asia and The Himalayan Region and their Diaspora.
Pritha Chandra, *Ph.D. (Univ.of Maryland)*	Linguistics, Theoretical Syntax and Semantics, Language Acquisition, Biolinguistics.
Shantanu Ghosh, *Ph.D. (JNU)*	Neuro Cognition and Neuro Imaging, Psychophysics, Language Processing, Auditory Perception.
Farhana Ibrahim, *Ph.D. (Carneel Univ.)*	Sociology of India, Nationalism and the Nation, State Sociology of Religion, Historical Anthropology, Oral Histories, Collective Memory, Conflict.
P. Vigneswara Ilavarasan, *Ph.D. (IIT/K)*	Sociology; Work, Industry; Society; Technology & Society; Information Technology Industry; India; ICTD; Electronic Governance.
Stuti Khanna, *D. Phil. (Oxford Univ.)*	Modernism, Postcolonialism Twentieth-Century Literature, Indian Writing in English, Cities and Gender.
Angelie Multani, *Ph.D. (JNU)*	Indian Theatre in English, Culture Studies, Gender/Studies, Contempory Fiction.

Bharati Puri, *Ph.D. (JNU)*	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.
Kamlesh Singh, *Ph.D. (Univ.of Raj.)*	Positive Psychology, Personality, Neuro-cognitive Science & Environmental Psychology.

Senior Scientific Officer I

Syamala Kallury, *Ph.D. (Andhra Univ.)*	Indian English Writing, Indian Literatures, Comparative Studies and Telugu Literature.

English Language Instructors

Bharati Shokeen, *M. Phil. (Kurukshetra Univ.)*	Linguistics, English Literature, ELT, Technical Communication.
Seema Tandon, *Masters, (Bhopal Univ.)*	English Literature, Language Pedagogy.

The Department offers elective courses in major areas of Humanities and Social Sciences. These courses are offered for undergraduate students in: Sociology, Psychology, Economics, Philosophy, Literature, Linguistics, Communication Skills and Policy Studies. In the first year, students who need help in English are given instruction in the disciplines with a focus on English language learning.

At the Postgraduate level, the Department offers open elective courses in Humanities and Social Sciences. These courses are designed to provide students with specialized disciplinary perspectives as well as broad - based interdisciplinary orientation. The Department also participates in the teaching of courses in collaboration with other Departments and Centers in the Institute. Four new faculty have been recruited and the Department is in a state of expansion.

The Department provides facilities for research leading to the Ph.D. degree in the following areas:

(a) Educational, Psychology Industrial and Organisational Psychology; Organizational Behaviour, Human Resource Management, Social Psychology Positive Psychology, Environmental Psychology, Cognitive Psychology.

(b) Sociology of Culture and Knowledge, Sociology of Development, Sociology of Religion, Gender Studies, Visual Sociology, Environmental Sociology, Ethnicity and Nationals Scoiology, Palatial Sciology.

(c) Economic Theory, Development Economics, International Economics, Quantitative Economics, Transport Economics, Environmental Economics, Industrial Economics, Indian Economy.

(d) British & American Literatures, Theory of Criticism, Indian English and Postcolonial Literatures.

(e) English Language, Linguistics, Philosophy of Language, Cognitive Studies.

(f) Epistemology, Metaphysics, Ethics, Aesthetics, Continental Philosophy-Phenomenology, Hermeneutics, Deconstruction, Philosophy of Science, Technology and Social Sciences.

(g) History of Science, Sociology of Science, Technology & Society.

(h) Interface of Science and Technology with Humanities, Behavioural and Social Sciences and Management.

(i) Language & Communication, Technical Communication.

Special pre-Ph.D. courses are offered to meet the requirements of individual research scholars.

The Department also runs classes in French, German, Japanese and various other languages for the benefit of the Institute community. It has a Language Laboratory providing back-up facilities for language teaching and research. As well as a Behavioural and Cognitive Science Lab and a Computer Laboratory.

Department of Management Studies

Professor and Head

Surendra S. Yadav, *Ph.D. (Paris)*	International Finance, Financial Management, International Business, Corporate Governance.

Professors

Rajat K. Baisya, *Ph.D. (Jadavpur Univ.)*	Marketing Management, Strategic Management, Entrepreneurship Management, Technology Management, Public Sector Management, International Business Management.
Devinder Kumar Banwet, *Ph.D.(IIT/D)*	Production Operations Management, Project Management and Operations Research, Supply Chain Management, TQM, Facilities, Planning & Industrial Engineering, Entrepreneurship and Technology Management.
Kanika T. Bhal, *Ph.D.(IIT/K)*	Organisation Management, Leadership, Business Ethics & Culture.
Vinayshil Gautam, *Ph.D. (FRAS, London)*	Organization Management, Behaviour and Development, Entrepreneurial Management, Information Systems.
M.P. Gupta, *Ph.D.(IIT/D)*	MIS Electronic Commerce & e-Governance.
P.K. Jain, *Ph.D. (Delhi Univ.)*	Financial Management, Development Banking, Financial & Management Accounting.
Sudhir K. Jain, *Ph.D.(IIT/K)*	Managerial Economics, Intellectual Property Rights, Entrepreneurship Management.
Sushil, *Ph.D. (IIT/D)*	Management of Technology, Flexible Systems Management, Strategic Management.
Ravi Shankar, *Ph.D.(IIT/D)*	Operations Management, Management of Information Technology, Manufacturing Systems, e-Business.

Associate Professor

Kiran Momaya, *Ph.D.(Toronto)*	International Competitiveness, Technology Management, Project Management.

Assistant Professors

Harish Choudhary, *Ph.D. (IIT/D)*	Entrepreneurship Management, Marketing Management.
Mahim Sagar, *Ph.D. (IIITM/Gwalior)*	Marketing Management, Brand and Product Management Strategy, Business Ethics.
S.P.Singh, *Ph.D.(IIT/K)*	Operational Management, Supply Chain Management, Maufacturing Systems.
Seema Sharma, *Ph.D.(IIT/D)*	Managerial Economics, Statistics, Market Research.

Adjunct Faculty

Jaijit Bhattacharya, *Ph.D.(IIT/D)*	IT Management.

Regular Visiting Faculty

Sanghamitra Bhattacharyya, *(FPM_IIM Calcutta)*	Organizational Behavior and Human Resource Management.

Honorary Visiting / Guest Faculty

Vinay Bharat Ram, *Ph.D.*	Chairman & Managing Director, DCM Group, Managerial Economics
K.V. Damodaran, *Ph.D.*	Joint Director, Telecom Regulatory Authority of India.
S.G.Deshmukh, *Ph.D.*	Director, IITM Gwalior.
Abid Haleem, *Ph.D.*	Jamia Milia University Delhi.
Arun Kanda, *Ph.D.*	Mechincal Engg., IIT Delhi.

M.Y. Khan, *Ph.D.*	Ex-Dean, Dept. of Financial Studies, Delhi University.
A.Khurana, *Ph.D.*	Humanities & Social Science, IIT Delhi.
Stan Kuchnowski, *Ph.D.*	Columbia University.
Arvind Mahajan, *Ph.D.*	Lamar Savings, Professor of Finance, Mays Business School, Texas.
Suman Modwel, *Ph.D.*	ENPC School of International Management, Paris.
P. Rai, *Ph.D.*	Director, WIPO.
Shyam S. Sethi, *Ph.D.*	Life Time Advisor, Whirlpool and Consultant, New Delhi.
Umeshwar Srivastav, *MD*	GS Software Solutions Ltd. Gurgaon.
Vinay Kumar, *Ph.D.*	Ex-Advisor, DSIR.
V. Upadhyaya, *Ph.D.*	Humanities & Social Science, IIT Delhi.
Ashok Wahi, *Ph.D.*	Director, Convergys.

Post Graduate Management education began in IIT Delhi in 1976 with Professor Sudhir Kakar as first Co-ordinator of the PG program in what was then the 'School of System and Management Studies'. Through gradual process of evolution, when Professor Vinayshil Gautam was the Head in 1993, it acquired the statutory status of 'Department Management Studies' under the I.I.T. Delhi Act.

The formal appellation of Master of Business Administration (MBA) for PG program in Management came in 1997. The Department currently runs a two-year full time general MBA programme with focus on 'Management Systems', 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 part time MBA programme with focus on 'Technology Management'. Apart from the specialised compulsory courses in the focus area, the students have choice for functional area specialization in Finance, Marketing, Information Systems, Organisation and HR etc. The students in two-year full time MBA programme are admitted through a rigorous screening process under Joint Management Entrance Test (JMET) comprising of an admission test, group discussion and interview. This test is used by all the IITs & IISc for admissions to their management programme. Admission to MBA (Part-Time) programme is also done through a process of written test, group discussion and interview, organized in a customised mode.

The Department of Management Studies (DMS) has some distinguishing features:

- Heavy research orientation, which is used extensively for designing courses to respond to current industry issues and continuously revise the contents of the courses.
- Home to country's first research series on 'Comparative Management Practices in Asia'.
- Faculty who have served on various UN related bodies and international professional association.
- A widely acclaimed faculty, which has been invited to teach in various parts of the globe.
- Faculty which is sought after nationally and internationally for consulting activities.
- One of the pioneering entrepreneurship programs in the country that has obtained funding and support from various agencies including SIDBI.
- Pioneer in IPR education among the technical institutions in the country.
- Till date in more than three decades of existence, over seven dozen PhDs have been produced.
- 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 five (5) dozen books and over 1000 papers in various journals and conference volumes.
- World class IT infrastructure with a very high computer to student ratio, a rich software repository that facilitates computer aided instructions and enables hands on experience on leading business enterprises.

The Department has also sponsored reference material in a wide range of Management areas including two sets of publications brought out in a series mode. The first one entitled 'Researches in Management in Asia Series', has 10 volumes published by the Departmental Faculty and the second one includes research publications in the area of e-Governance, Additionally, the Department has MoUs and/or active collaboration with institutions such as:

- Modi Corp
- IBM, India
- Hummingbird
- Asian Institute of Technology, Bangkok
- ENPC, France
- A Al_Sager Foundation
- MacMillan, India
- University of Paris1, Pantheon-Sorbonne, Paris
- International Centre for Promotion of Enterprises Ljubljana, Slovania
- Hughes Escort Communication Ltd. (DirectWay)
- Sun Microsystems, India
- Stevens Institute of Technology, NJ, USA

Sponsored Research and Consultancy Areas

Some of the areas of research and consultancy undertaken by the Department include : General management, total Quality Management, Management and Operation Research, Project Management, Systems Analysis and Application, Software Development and Management, Management of Technology, Management Information System, Flexible Systems Management, Human Resource Management, Organization Management, Behavior and Development, Financial Management, Financial Analysis, Planning and Control, Development Banking, Corporate Planning and Strategic Management, Economic Analysis, Marketing Management, Training and Development, Public Sector Management, Longitudinal & Lateral Thinking, Entrepreneurship Management, Management and Planning of Service Sectors, Comparative Management, Telecom Systems Management e-Business Competitiveness. Competitiveness, Asian Management Practices, Software Engineering, Enterprises Resource Planning, International Finance, Rural Marketing Management, Agri-Business Management.

Ph.D. Research Areas

Manufacturing & Operations Management, Decision Sciences and Operations Research, Enterprise Resources Planning, Logistics and Supply Chain Management, Project Management, Comparative Management, System Analysis and Computer Applications, Management of Information Technology, Network Security Management, Management Information System & Decision Support System, Electronic Commerce, e-Business, e-Governance System Approach to Waste Management and Productivity. Human Resource Management, Organization Management, Organization Behavior and Development, Leadership, Culture Business Ethics, Financial Analysis and Control Financial Management of Manufacturing and Service Sectors, International Financial Management, Risk Management, Managerial Economics, Productivity and Efficiency Analysis, International Economics, Business Forecasting, Economic Feasibility Techno Economic Analysis, Marketing Management, Industrial and High-Tech Marketing, Public Sector Management, Entrepreneurial and Entrepreneurship Management, Management of Technology, Management and Planning of Service System (Energy, Transportation, Health Care, Banking), Corporate Entrepreneurship, Corporate Planning and Strategic Management, Global Strategy and Strategic Alliances, Global Competitiveness, Business Excellence, General Management, Total Quality Management, Flexible Systems Management, Comparative Management, Product Management, Business Process Reengineering, Mergers and Acquisition, Strategic Business Management, Knowledge Management, International Marketing Management, Industrial Marketing and Service Marketing Management, Longitudinal and Lateral Thinking, IPR Investment Management, International Business and Negotiations, Corporate Governance, R&D Management, Infrastructure Management, Strategic Marketing, Product Management, Sales and Distribution Management, Market Research, Consumer Behavior, e-Marketing, Customer Relationship Management, Retain Management Country Competitiveness.

Other Relevant Activities

Consultancy & Related Management Activities

The Department has undertaken consultancy work on behalf of Government Departments such as Department of Education, Department of Science and Technology, Ministry of External Affairs; CBI; and Department of Rural Development etc. It has provided consultancy support to various service and manufacturing sector industries and co-operatives besides research support for international organizations like the U.S. Air Force. It has also provided professional inputs to voluntary professional associations such as Indian Society for Technical Education (ISTE), All India Management Association (AIMA), Indian Society for Training & Development (ISTD), IFTDO and ARTDO International etc. The Department has also made contributions to the developmental activities of companies such as HTA, Arthur Anderson, Dubai Port Authority, Malaysian Institute of Insurance, Indian Petro-Chemicals Limited (IPCL) and Oil & Natural Gas Corporation (ONGC). Its expertise has been sought in Germany, France, Mauritius, Saudi Arabia, UAE etc. The faculty has received prestigious fellowships from the United Nations Development Programme, Shastri-Indo Canadian Institute Calgary, Royal Asiatic Society London, ARTDO International Manila, All India Management Association, Indian Society for Training & Development, India International Friendship Society and other major national and international professional associations.

Researches in Management in Asia Series

Ten volumes have been published by the faculty of the Department in this series.

SIDBI Program on Entrepreneurship

The programme actively covers Entrepreneurship Management Education and Research. As part of this, SIDBI sponsored three-phase programs are designed, developed and implemented for developing skills and competencies for entrepreneurial ventures. It also runs entrepreneurship awareness programs and Science and Technology Upgradation programs.

Intellectual Property Rights Cell

Department of Management Studies had taken early initiative in 1992/1993 towards strengthing IPR education among all sections of IIT(D) community. Since then several IPR education programs and conferences have been conducted by the Department, including the 'International Conference on Intellectual Property Education and Training' which was jointly sponsored by WIPO and MHRD in July 2001. IIT Delhi is the first technical institution in the country to have started a full-semester course on IPRs.

Management Development Programs

The contribution of the faculty has been particularly sought in areas of Innovation, Information Systems, organization/Human Resource Management, Longitudinal Thinking, Operations Management, Entrepreneurship, Organisation Design, IPR, International Finance, International Business Competitiveness, Flexibility, Developmental Banking, Sales & Marketing Management. The Department has a high profile in the world of learning-training activities and activities related to development of organizations and the government. Major industries of the public sector such as ONGC, BHEL, SAIL, BEL, HAL, Indian Oil, CMC, EIL, Indian Airlines, National Fertilizers, RITES, IRCON, MUL, HZL, NALCO, BPCL, NFL, STC to name a few, have drawn upon the expertise of the Department. Private organizations such as Shriram Group, JK organization, Birla Group of Companies, Modi Group of companies, UB Group, MRF, BPL and national Industry associations such as ASSOCHAM, CII, FICCI and PHDCCI have found it profitable to relate to the Faculty at the Department.

Contribution at Policy Making Level

The Department has contributed in the policy formulation and operational activities at the highest level of the Government, UGC, AICTE, Ministry of Human Resource Development, Ministry of Science & Technology and various corporate enterprises. Our faculty has been invited to the board of various corporate enterprises such as Export & Import Bank of India, Excel Group of Industries, JK Industries, SpiceJet, SAIL, Moser Baer, NPCC, Hero Group etc.

Major Conferences Organized by the Department

(i) Hosted the Silver Jubilee Convention of ARTDO International in 1998.

(ii) Hosted the International Conference on IP Education, Teaching and Training in July 2001 jointly with World Intellectual Property Organization (WIPO) and the Ministry of HRD.

(iii) Organized the National Workshop on IP Education and Research in August 2005 jointly with WIPO and the Ministry of HRD.

(iv) Hosted the WIPO National roundtable on the Economics of Intellectual Property in March 2007.

(v) Hosted the ISTD Northern Regional convention 2008 jointly with ISTD Delhi chapter in April 2008.

Facilities Available

The Institute has the most modern computational and laboratories facilities. It has a "***Center for Excellence in e-Governance***". The Department has a fully equipped "***Management Laboratory***" which is equipped with in-house Camera, TV, VCR, Projection System besides PCs which are networked. The students have access to Internet and the Central Library, which contains a large section of management books as well as Department Library. In addition, the department is equipped with specialized labs such as Enterprise Applications Lab, e-Commerce Lab, Behavioral Lab and Strategy and Competitiveness lab to help the students develop their skills and have hands on experience in various tools.

Journal of Advances in Management Research (JAMR)

Launched in year 2003 by the Hon'ble President of India Dr. A.P.J. Abdul Kalam, the 'Journal of Advances in Management Research (JAMR)', published by the Department, fulfills much desired vacuum of a refereed periodical in India that sets standard for research quality. This Journal provides a platform for the dissemination of research in current and emerging areas of management. It is a refereed journal and is known for the quality of research papers that appear in it.

Center for Excellence in E-governance

A 'Center for Excellence in E-governance' has been established to promote research in the area of e-governance. It is a state of the art facility for research and training on e-governance.

Parivartan – Annual Management Festival

One of the most eagerly awaited business festivals, Parivartan is aimed at providing the young management prodigies of the country a platform to know, discuss and debate on contemporary corporate and social issues, thus igniting in them the fire to think and deliver. It is aimed at providing an opportunity to all the B-School barons culled from all corners of the country to pull up their socks and get down to identifying opportunities and indulge in some interesting brainstorming, delve into problems and develop innovative solutions to transcend all the stereotypes and emerge the real winners. The icing on the cake lies in the fact that this is an event focused not just on pressing your grey cells, but also on making you sweat, literally thanks to the plethora of fun events that are a part of Parivartan! Parivartan'07 included a wide audience and invited participation from premier colleges countrywide and involved them in an invigorating indulgence into the world of business.

Building India Inc

"Building India Inc", the annual seminar series organized by Department of Management Studies IIT Delhi, is a podium to highlight the contribution of Corporate India in the Indian Economy and towards making India a developed nation. This seminar is an attempt to bring together the government, corporate and the academia, to deliberate on the issues and challenges facing the nation and share their experiences and views with the larger audience. Building India Inc, witnesses active participation from top people in the corporate world, faculty from leading institutions and students from top B-schools. Building India Inc. (BII) is known for raising topics of contemporary Indian relevance, the professional treatment on them by eminent dignitaries from the practicing world and the appetizing question and answer session that customarily follows. It provides a splendid opportunity for the management students at DMS to conceive, create and

carry out a full fledged event on a subject of their interest as well as to provide a stage on which to interact with distinguished practitioners from the field

Rostrum

Rostrum is a monthly seminar series, with each session focusing on one functional area of management. During the seminar, speakers from the industry come to the campus and give their views on the issues under study. The seminar is an interactive session thus helping the students to learn from real industry pracitioners.

Rostrum Series

- Strategy Rostrum
- Marketing Rostrum
- Finance Rostrum
- Media and Communication Rostrum
- HR Rostrum
- Operations Rostrum
- IT Rostrum
- Telecom Rostrum

Student Clubs

- Marketing Club (The 5th P Prodigy)
- IT Club (I-Prabhat)
- Operations Club (OP Centre)
- Finance Club (Finatics Club)
- Strategy Club (Club Strategica)
- HR Club (Resource Dimensions)

The objective of these clubs is to provide students a platform to discuss relevant emerging issues in each of these functional areas. People from the industry are invited to present their views at the sessions of these clubs. These clubs form a part to the industrial interaction committee and help organize the respective rostrums.

More details of the Department can be found at www.mbaiitd.org.

Department of Mathematics

Professor and Head

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

Professors

B. Chandra, *Ph.D. (Delhi)*	Neural Networks for Pattern Classification, Statistical Clustering of Gene Expression Data, Data Mining, Databases, Adaptive Forecasting.

Associate Professors

N. Chatterjee, *Ph.D.(London)*	Natural Language Processing, Logic and Reasoning, Statistical Modeling and Semantic Web.
S. Dharmaraja, *Ph.D. (IIT/M)*	Applied Probability, Queuing Theory, Performance Modeling.
Subiman Kundu, *Ph.D. (Virginia)*	Topology, Measure Theory.
B.S. Panda, *Ph.D.(IIT/K)*	Parallel and Distributed Computing, Graph Theory and Algorithm, Algorithms.
S.C. Sekhara Rao, *Ph.D. (IIT/K)*	Parallel Computing, Numerical Analysis.
A. Tripathi, *Ph.D. (Suny Buffalo)*	Number Theory, Combinatorics and Graph Theory.

Assistant Professors

B. Behera, *Ph.D.(IIT/K)*	Harmonic Analysis, Wavelet Analysis.
Aparna Mehra, *Ph.D. (Delhi University)*	Mathematical Programming.
Mani Mehra, *Ph.D. (IIT/K)*	Application of Wavelets to Numerical Analysis and PDEs.
Anima Nagar, *Ph.D. (GU, Ahmedabad)*	Topological Dynamics.
A. Nagabhushanam, *M.Sc. (Delhi)*	Stochastic Models.
Ritumoni Sarma, *Ph.D. (TIFR)*	Algebraic Groups.
Wagish Shukla, *Ph.D. (IIT/K)*	Category Theory, System Theory, Fuzzy Sets and Applications.
K. Sreenadh, *Ph.D. (IIT/K)*	Differential Equations and Analysis.
V.V. Srinivas Kumar, *Ph.D. (IIT/K)*	Numerical Methods for Partial Differential Equations.

Emeritus Professors

Suresh Chandra, *Ph.D. (IIT/K)*	Mathematical Programming, Neural Networks Based Optimization.
B.R. Handa, *Ph.D. (IIT/D)*	Combinatorial Methods in Statistics, Statistical Inference.
J.B. Srivastava, *Ph.D. (IIT/K)*	Group Theory and Group Theoretical Methods, Applications to Comupter Vision.

The Department offers courses in Mathematics both at the undergraduate and postgraduate levels. It runs a 5-year integrated M.Tech. programme in Mathematics & Computing and a two-year M.Sc. programme in Mathematics. Besides, it has its own research programme for which a number of pre-Ph.D. courses are floated every semester. The department is also the parent department for the interdisciplinary M.Tech. programme in Computer Applications. The courses at all levels are kept constantly reviewed to equip the students with competence to meet the academic and professional challenges. The Department regularly organizes seminars, summer schools, symposia etc.

Academic Programmes

5-year Integrated Master of Technology in Mathematics and Computing

The Department offers a 5-year integrated course leading to the degree of Master of Technology in Mathematics and Computing.

This programme aims at training students to enable them to handle problems in software industry, public undertakings, defence, CSIR and other national laboratories through the combined use of mathematical and computer techniques. The emphasis is on training the students in basic theory of all aspects of theoretical computer science, computational techniques, mathematical modelling, simulation, probabilistic and statistical tools, and giving them opportunity to develop their own software programmes for the several problems which they come across in these organizations.

2-year Master of Science in Mathematics

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 programme 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. In the second year, the student has option of choosing modern advanced courses in some specialized area(s). As the intake of students 40 is, every student enjoys the benefit of receiving personal attention of the teachers.

2-year M.Tech in Computer Applications (Interdisciplinary)

This programme is based in the Department of Mathematics.It is however run jointly with the department of Computer Science and Engineering and the department of Electrical Engineering. Other participating Departments include Applied Mechanics, Mechanical Engineering, CARE & CAS.

Ph.D.

Research facilities all major areas of Pure Mathematics, Applied Mathematics, Numerical Analysis, Statistics and Operations Research, Theoretical Computer Science and their Applications. As per rules a student admitted to the Ph.D. programme of the department is expected to register for a minimum of 12 credits of course work depending upon the recommendations of the department.

Post Doctoral Research

The Department welcomes post doctoral fellows in all of mathematics. Currently the Department is engaged in the following main research areas.

1. Algebra, Functional Analysis, Category Theory, Cryptography, Number Theory, Topology, Wavelet Analysis, Differential Operators, Topological Dynamics and Computational Topology.
2. Applied Mathematical Methods,Analytical and Numerical Methods in Ordinary and Partial Differential Equations,Numerical Analysis, Computational Methods, Finite Element Methods.
3. Operations Research, Mathematical Programming, Queuing Theory, Statistical Inference, Combinatorial Methods in Statistics, Stochastic Processes, Statistical Computations.
4. Theoretical Computer Science, Parellel Computing, Machine Translation, Algorithms and Scientific Computing,Information Retrieval, Natural Language Processing,Neural Networks, Data Mining.

Laboratory Facilities

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

Department of Mechanical Engineering

Professor and Head

J. P. Subrahmanyam, *(NTPC Chair), Ph.D (IIT/D)*	Internal Combustion Engines, Combustion Generated Pollution, Alternate Fuels, Computer Simulation.

Professors

Naresh Bhatnagar, *Ph.D. (IIT/B)*	FRP Composite Materials, Processing & Manufacturing, Machining of Traditional and Non-Traditional Materials, Quality & Audit System Analysis.
Anoop Chawla, *Ph.D. (IIT/K)*	CAD, CAE, Dynamics, Bio-mechanics, AI & Expert Systems for Design and Manufacturing.
S. G. Deshmukh, *Ph.D. (IIT/B)*	Supply Chain Management, Quality Management, Information Systems, System Optimization.
P. L. Dhar, *Ph.D. (IIT/D)*	Refrigeration and Air-Conditioning, Heat Transfer, Computer Simulation and Design of Thermal Systems, Holistic Technology.
R. R. Gaur, *Ph.D. (IIT/D)*	Internal Combustion Engines, Sustainable Energy Systems, Holistic Technology.
Kshitij Gupta, *(BHEL Chair) Ph.D. (IIT/D)*	Vibrations, Mechanical Design, Rotor Dynamics, Composite Materials.
Sanjeev Jain, *Ph.D. (IIT/D)*	Eco-friendly Refrigeration and Air-conditioning Technologies, Heat Exchangers Design, Energy Conservation.
S. R. Kale, *Ph.D. (Stanford)*	Heat Transfer, Fluid Mechanics, Particle Laden Flows, Combustion and Energy Conversion.
Arun Kanda, *Ph.D. (IIT/D)*	Industrial Engineering, Operations Research, Production and Project Management.
T. K. Kundra, *Ph.D. (IIT/D)*	Mechanical System Design, Concurrent Engineering, Vibration Design, CAD/CAM, Finite Element Model Updating.
Sudipto Mukherjee, *(Mehra Chair) Ph.D. (Ohio State)*	Mechanisms, Robotics, Mechanical Systems Design, Impact Biomechanics.
Sunil Pandey, *Ph.D. (IIT/D)*	Production Engineering, Welding Technology, Process Engineering, Manufacturing Process.
P. V. Madhusudhan Rao, *Ph.D. (IIT/K)*	CAD/CAM, Design-Manufacturing Integration & Micro & Nano-Manufacturing.
P. Venkateswara Rao, *Ph.D. (IIT/M)*	Conventional and Non-Conventional Material Removal Process, Measurement & Control.
M. R. Ravi, *Ph.D. (IISc., Bangalore)*	Computational Fluid Dynamics, Heat Transfer, Renewable Energy, Rural Energy Systems.
Anjan Ray, *Ph.D. (Michigan State)*	Combustion, Heat Transfer.
R. Sagar, *Ph.D. (IIT/D)*	Production Engineering, Metal Forming, Composites, CIMS and Robotics.
Subir K. Saha, *Ph.D. (McGill)*	Robotics, Mechatronics & Multibody Dynamics.
Satinder Paul Singh, *Ph.D. (IIT/D)*	Dynamics of Rotating Machinery, Composite Materials, Machine Design, Active Vibration Control.
P. M. V. Subbarao, *Ph.D. (IIT/K)*	Experimental Turbulence, Tomography, Power Generation Systems and IC Engines.

Visiting Honorary Professors

B. C. Nakra, *Ph.D. (London)*	Vibrations Engineering, Instrumentation & Control, Mechatronics, Mechanical Design.
Prem Vrat, *Ph.D. (IIT/D)*	Industrial Engineering, Operations Research, Management.

Associate Professors

J. K. Dutt, *Ph.D. (IIT/D)*	Rotor Dynamics, Vibration & Control.
A. D. Gupta, *M.Tech. (IIT/D)*	Industrial Engineering, Operations Research, Value Engineering, Industrial Quality Control.
Sangeeta Kohli, *Ph.D. (IISc., Bangalore)*	Heat Transfer, Fluid Mechanics, Renewable Energy Technology.
D. Ravi Kumar, *Ph.D. (IIT/M)*	Metal Forming, Plasticity, Formability of Sheet Metals, Mechanical Metallurgy.
Kiran Seth, *Ph.D. (Columbia)*	Operations Research, Applied Probability Models, Fuzzy Models.
Harish Hirani, *Ph.D. (IIT/D)*	Bearings (Hydrodynamic, rolling element and magnetic), Synthesis and application of Smart (Magnetorheological fluids), Mechanical face seals.

Assistant Professors

S. Aravindan, *Ph.D. (IIT/M)*	Ceramics, Composites, Welding, Nano-Manufacturing.
Nomesh Bolia, *Ph.D. (UNC Chapel Hill)*	Operations Research Scheduling, Modelling in Wireless Networks, Logistic Improvisation.
Ashish K. Darpe, *Ph.D. (IIT/D)*	Condition Monitoring, Rotor Dynamics, Vibration.
Sudarsan Ghosh, *Ph.D. (IIT/Kgh)*	Machining and Grinding.
Vipul Jain , *Ph.D. (IIT/D)*	Supply Chain Management, Planning, Analysis & Control of Manufacturing Systems, Expert System.
Sunil Jha, *Ph.D. (IIT/K)*	Machining and Finshing Processes, Micro and Nanofinishing, Mechatronics, Robotics, Manufacturing Automation, Smart Fluids.
M. S. Kulkarni, *Ph.D. (IIT/B)*	Quality and Reliability Engineering.
S. V. Modak, *Ph.D. (IIT/D)*	Vibration Engineering, Finite Element Model Updating, Experimental Modal Analysis.
Pulak Mohan Pandey, *Ph.D. (IIT/K)*	Rapid Prototyping, Unconventional Machining, Finite Elements Applications to Manufacturing, CAD/CAM.
Rahul Rebeiro, *Ph.D. (Texas A& M)*	Biomaterials, Tribology, Tissue Properties.
Prabal Talukdar, *Ph.D. (IIT/G*)	Radiative Heat Transfer, Heat and Mass Transfer in Porous Media, Moisture Transfer in Buildings, Computational Fluid Dynamics.
B. Premachandran, *Ph.D. (IIT/M)*	Heat Transfer, Computational Fluid Dynamics.

The Mechanical Engineering Department currently has two bachelor programmes namely B.Tech. (Mechanical Engineering) and B.Tech. (Production & Industrial Engineering). The Objective of the undergraduate programme is to prepare the manpower who are globally the best. Most of the students who graduate from the department, end up taking leading positions in industry, academia and government in both India and abroad.

The Department has four masters programmes namely M.Tech. (Design of Mechanical Equipment), M.Tech. (Industrial Engineering), M.Tech. (Production Engineering) and M.Tech. (Thermal Engineering). Along with other departments, Mechanical Engineering Department was instrumental in starting an interdisciplinary masters programme in Power Generation Technology which is completely sponsored and also meant for industry personnel. Department has two research programmes namely M.S. (Research) and Ph.D. Programmes with specializations in the areas of Mechanical Design, Industrial Engineering, Production Engineering and Thermal Engineering.

The department has a faculty strength of 47 (37 in position). Faculty members of the department are also occupants of different chairs of the Institute which include BHEL Chair, NTPC Chair, Mehra Chair and Ray W Herrick Chair. Department has a technical staff of 35 who are associated with 23 different laboratories in the department.

Mechanical Engineering Department collaborates with many national and international institutions and organizations. The notable among them are KAIST (South Korea), Concordia University (Canada), Asian Institute of Technology (Thailand), INSA de Lyon (France), L'Ecole Des Mines De Nantes (France), Ecole Centrale de Lille (France), Auburn University (USA), EPFL (Lausanne) Ohio Sate University (USA), The University of Massachusetts (USA), Several German Universities under DAAD programme, NTPC (India) and CAPART (India).

The Department faculty is actively engaged in carrying out sponsored research work with funding from many national and international funding agencies which include Department of Science & Technology (DST), Department of Biotechnology (DBT), Indian Council of Medical Research (ICMR), Council of Scientific & Industrial Research (CSIR), Defense Research Development Organization (DRDO), Simulator Development Division (Ministry of Defense), Ministry of Non-Conventional Energy Sources, Ministry of Road Transport & Highways, European Commission, Naval Science & Technology Laboratory (NSTL), Ministry of Textiles, Ministry of Human Resource Development, Ministry of Finance, Delhi Police

Department faculty takes up many industrial consultancy projects annually. Some of the notable sponsors of consultancy projects in recent years include Deloitte Touche Tohmatsu, General Motors, National Thermal Power Corporation, MINDA Industries, Bharat Heavy Electricals Limited, LG Electronics, Tata Energy Research Institute, Tata Steel, Sona Koyo Steering Systems Ltd., Samtel Electronics, Japan Automotive Research Institute (JARI), Virtual Engineering, Nexant SARI Energy, INFRAS, Applied Research International, Fedders Lloyd, Anand Nishikawa, Alstom Tech. Center, Anesta Iwata Motherson and Simpri Investments.

Research

Department is very active in all major areas of research in Mechanical Engineering. Following are some of the major and minor areas where the department faculty is very active.

Mechanical Design: Mechanical Vibrations, Rotor Dynamics, Damped Structures, Composite Structures, Smart Structures, Active Vibration Control, Experimental Modal Analysis & 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, Modelling the Impact of Vehicles, Impact Biomechanics, Concurrent Engineering Design, Mechanisms, Robotics, Multibody Dynamics, Application of Multibody Dynamics in Design and Analysis of Rural Engineering Systems, Mechatronics, Sensors and Actuator Design, MEMS, Design of Microsystems, Nano-Mechanics, Artificial Intelligence Applications in Mechanical Engineering & Expert Systems for Design & Manufacturing and Mechanical Engineering Applications to Medical Science.

Thermal Engineering: Internal Combustions Engines, Phenomenological and Multi-dimensional Modeling of Engines, Combustion, Radiation from Flames, Engine Simulation, Turbo Charging, Combustion Generated Pollution, Alternate Fuels, Utilization of Biogas, Biomass Gasification, Energy Efficient Kilns, Energy Flow Through Radial Rectilinear Cascades, Centrifugal and Axial Compressors Internal Flow and Laser Anemometry, Optimization of Power Plants, Sustainable Energy Systems, Computer Simulation and Design of Thermal Systems, Refrigeration & Air Conditioning Systems, Thermal Comfort, Fire Research, Air Water Spray Injection, Waste Heat Utilization, Energy Conservation, Renewable Energy Sources, Heat Transfer, High Temperature Natural Convection Microchannel Heat Exchangers, Particle-laden Flow, Fluid Mechanics & Machines, Turbulence Computational Fluid Dynamics (Cfd) Turbo Machines.

Production Engineering: Metal Cutting, Metal Forming, Welding, Metal Casting, Material Characterization, Non-traditional Manufacturing Processes, Measurements & Metrology, Grinding of Ceramics and Metal Matrix Composites, Processing of Polymers & Composites, Injection Molding, Microcellular Injection Molding, Finite Element Applications in Manufacturing, CAD/CAM, Rapid Prototyping, Intelligent Manufacturing, Micro & Nano-Manufacturing, Biomaterials and Medical Implants, Nano-Composites, Modeling of Material Behavior, Lean Concepts in Machine Tool Design.

Industrial Engineering: Industrial Quality Control, Quality, Reliability and Maintenance, Lean Manufacturing, Productivity Management, Queuing, Systems Simulation, Simulation Dynamics, Operations Research & Management, Production & Materials Management, Project Management, Total Quality Management, Supply Chain Management, Computer Integrated Manufacturing Systems, Business Process Reengineering, Applied Probabilities, Facilities Planning, Enterprise Modeling, Information Systems, Decision Support Systems, Value Engineering, Flexible Systems, Healthcare Systems, Education Systems, Agile Manufacturing Systems, ERP, CIMS and Beyond, Enterprise Modeling, Enterprise Architecture, Extended Enterprises, Decision-Information Synchronization in Flexible Systems, Concurrent Planning, Methodology of Enterprise Modeling, Intelligent Manufacturing Systems, Knowledge Management, e-business, IT effectiveness in Enterprise Systems.

Department of Physics

Professor and Head

B.P. Pal, *Ph.D. (IIT/D)* — Telecommunication Optical Fibres and DWDM Components, Integrated Optics, Fibre-optic Sensors and Guided Wave Opto-electronics, Mircrostructured Optical Fibres, and Localization of Light.

Professors

Ajit Kumar, *Ph.D. (Moscow)* — Nonlinear Fibre Optics, Few-Cycle Laser Pulses, Nano-Magnetics.

Arun Kumar, *Ph.D. (IIT/D)* — Electromagnetic Wave Propagation through Optical Fibres and Integrated Optical Wave-guides, Fibre Optic Components and Devices, Analysis of Plasmonic Waveguides and Devices.

R. Chatterjee, *Ph.D. (IIT/K)* — Experimental Solid State Physics, Magnetism in Materials (Bulk and Thin Films), Amorphous and Quasi-crystalline Materials, Multiferroics, Heusler Alloys, Superconducting Oxides and other Oxides.

S. Chopra, *Ph.D. (Rochester)* — Quantum Optics, Laser Spectroscopy and Quantum Information.

B.D. Gupta, *Ph.D. (IIT/D)* — Fibre-optics, Applied Optics, Fibre Optic Sensors.

H.C. Gupta, *Ph.D. (IIT/D)* — Thermal and Electrical Properties of Solids and Liquids, Molecular Dynamics of Low-Dimensional Solids, Microwave Integrated Circuits, Raman and Infra Red Phonons.

S.C. Kashyap, *Ph.D. (IIT/D)* — Experimental Solid State Physics, Electronic Ceramics Ferromagnetic GMR Materials, Nano-Materials, Spintronics, High Temperature Superconductors, Passive Devices, Crystal Growth and Microwave Processing.

Vikram Kumar, *Ph.D.(Lehigh)* — Semiconductor Physics, Devices and Technology, Organic Semiconductors, Nano-Technology.

Bodh Raj Mehta, *Ph.D. (IIT/D)* — Experimental Solid State and Low Dimensional Physics, Nano-Particle-Gas Interaction, Nano-Structured Sensors, Rare Earch and Pd Composite Nano-Particle Structures, GaN and InN Semiconductor Nano-Particles and Nano-rod Structured. Advanced Oxide Semiconductor Materials.

D.K. Pandya, *Ph.D. (IIT/D)* — Experimental Solid State Physics, Thin Films, High Temperature Superconductivity, GMR Materials, III-IV Nitrides, Nano-Materials, Solar Energy, Spintronics, Nano-Magnetism, Data Storage, Ferromagnetic Semiconductors and Nano-Oxide-Semiconductors, Thin Film Solar Cells.

G.B. Reddy, *Ph.D. (IIT/D)* — Thin Film Technology, Smart Materials and Smart Windows, Nano-Structured Films.

Anurag Sharma, *Ph.D. (IIT/D)* — Fiber Optics, Integrated Optics, Gradient Index Optics, Applied Optics, Numerical Modelling of Guided Wave Optical Devices.

M.R. Shenoy, *Ph.D. (IIT/D*) — Optoelectronics, Fibre and Integrated Optics, Optical Fiber Components.

R.K.Soni, *Ph.D.(IIT/D)* — Laser Processing of Materials, Nanophotonics, Fluorescence and Raman Spectroscopy.

K.Thyagarajan, *Ph.D. (IIT/D)* — Optical Fibre Communication, Optical Fiber Amplifier and Gratings, Nonlinear Interaction in Optical Fibres.

V.K. Tripathi, *Ph.D. (IIT/D)* — Plasma Physics, Laser Driven Fusion, Magnetic Fusion, Free Electron Laser, Charged Particle Acceleration, Laser Material Processing, Plasma Effects at Nano- Dimensions.

V.D. Vankar, *Ph.D. (B.H.U.)* — Experimental Solid State Physics, Structure and Growth of Thin Films, Plasma Processing of Materials, Solid-Solid Interfaces.

Emeritus Fellows

Kehar Singh, *D.I.I.T. (IIT/D)* — Photonics, Applied Optics, Holography, Optical Data Security, Nonlinear Photo-refractives, Optical Computing, Nano-Optics, Photonic Bandgap Structures, Singular Optics.

Associate Professors

Varsha Banerjee, *Ph.D. (IISc., Bangalore)*	Statistical Mechanics of Spin System, Spin Glasses, Quantum Magnets and Quantum Glasses, Surface Growth Phenomena.
Sujeet Chaudhary, *Ph.D. (IIT/D)*	Experimental Condensed Matter Physics, Nano-Magnetism, Spintronics, Ferromagnetic Semiconductor, Materials for Oxide Electronics.
Joby Joseph, *Ph.D. (IIT/D)*	Photonics, Applied Optics, Holographic Data Storage, Digital Holography Optical Data Security, Photonic Structures.
Neeraj Khare, *Ph.D. (B.H.U.)*	Nano-Structure Functional Oxides, Diluted Magnetic Semiconductors, Superconductors, SQUIDS, Polymer Composites, Solar Cells.
Hitendra K. Malik, *Ph.D. (IIT/D)*	Plasma Physics.
P. Senthilkumaran, *Ph.D. (IIT/M)*	Applied Optics & Holography.
Pankaj Srivastava, *Ph.D. (Univ. of Rajasthan)*	Experimental Solid State Physics, X-ray Spectroscopy, Surface Physics.
R.D. Tarey, *Ph.D. (I.I.Sc.)*	Experimental Plasma Physics, Plasma Processing.

Assistant Professors

Santanu Ghosh, *Ph.D. (JNU, Delhi)*	Experimental Condensed Matter Physics, Thin Film, Ion Materials interaction.
Sankalpa Ghosh, *Ph.D. (JNU, Delhi)*	Bose Einstein Condensate of Cold Atoms, Quantum Hall Effect, Graphene, Quantum Computation.
A. Mishra, *Ph.D. (Utkal)*	Superconductivity in Quark Matter and Ultra-cold Atoms, In-medium Hadron Properties and Observable in High Energy Accelerator Experiments.
G. Vijaya Prakash, *Ph.D. (Univ. of Andhra)*	Nano-Photonics, Quantum Functional Materials, Non-linear Optics.
A.K. Shukla, *Ph.D. (IIT/D)*	Laser, Semiconductor, Raman Spectroscopy, Ion Implantation, Laser Annealing and Superconductors.
J.P. Singh, *Ph.D. (JNU, Delhi)*	Nano-Structure Growth, Nano-Science, Experimental Condensed Matter.
Rajendra Singh, *Ph.D. (JNU, Delhi)*	Semiconductor Materials and Processing, Nano-Electronics, Semiconductor Nano-Wires, Semiconductor Wafer Bonding, Wide Bandgap Semiconductors and Devices.
Aloka Sinha, *Ph.D. (IIT/M)*	Nonlinear Optics, Liquid Crystals, Optical Information Processing Biometrics.

Principal Scientific Officers

Mukesh Chander, *Ph.D. (IIT/D)*	Electronics and Photovoltaic Solid State Gas Sensors, Surface Characterization.
D. Ranganathan, *Ph.D. (IIT/D)*	Quantum Optics, Interferometry Laser Physics and Nonlinear Optics, Quantum Information, General Relativity.
R.K. Varshney, *Ph.D. (IIT/D)*	Optical Fibre Communication, Integrated Optics, Nonlinear Optics, Fiber Optic Sensors, Photonics Bandgap Structures and Devices.

The Department offers a variety of courses for undergraduate and postgraduate students. The course curricula are comprehensive and aim at providing the students with a solid foundation of the physical principles underlying new and emerging technologies. In order to fulfill this aim, the Department periodically carries out a review of the various curricula. The undergraduate engineering students belonging to all branches of engineering are offered a choice from courses under the Basic Sciences category. The Department also offers a large number of electives under open and emerging science and technology categories. It runs a four year B.Tech. programme in Engineering Physics. Besides, it runs the following postgraduate programmes: a two-year M.Sc. in Physics, and two-year M.Tech. programmes in (i) Solid State Materials, (ii) Applied Optics, (iii) Opto-electronics and Optical Communications - the last one being run as an interdisciplinary programme jointly with the Electrical Engineering Department. These programmes are unique since they train the students in certain applied areas, which do not fall within the domains of conventional engineering disciplines.

In addition to the well-equipped teaching laboratories, the students have access to many state-of-the-art research laboratories of the department. Our research infrastructure is excellent in terms of faculty expertise, high-quality and sophisticated instruments, cutting-edge technology equipments, several of which were installed in the department as central facilities and the same are being continuously upgraded. In the last five years, the department has been attracting several sponsored research projects, on an average worth of Rs. 6 crores per year. Research and teaching contribution of our faculty members have been internationally and nationally well recognized through plenary and invited talks at international conference and bestowing of many prestigious awards/fellowship, Fellowships of national and foreign science academics/societies, memberships of research councils and boards. Our research is broadly focused on topical area like Condensed Matter Physics, Optics and Photonics, Plasma Physics, and Theoretical Physics. Graduate students and their faculty mentors pursue state-of-the-art research on contemporary topics like nano science and technology, magnetics, microstructures optical fibers, photonic crystals, optical memory, microwave and laser-plasma interaction, quantum information processing etc.

Academic Programmes

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 is an excellent preparation for a broad range of careers. It is intended for those having strong aptitude in science and mathematics. However, the programme runs on similar lines as the other B.Tech. programmes of the Institute, it lays emphasis on emerging contemporary technologies and new concepts in areas like Nano-Technology and photonics. In the third year the students are required to undergo a practical training during summer at industries or R&D organization and in the 4th year they are required to carry out a technologically relevant major project.

M.Sc. in Physics

The M.Sc. (Physics) programme at IIT Delhi is unique in the country and is different from the normal M.Sc. Programmes at other Universities/Institutions. Being at an Institute of Technology, the course is designed to impart education and training with an applied bias rather than the conventional theoretical flavor. Further, commensurate with the expertise available at the department, the students get a deeper insight into one of the two streams: material science and optics/photonics. There is also a general stream which has electives on subjects not covered within these streams. In this general stream, there are some courses on theoretical physics; however, these courses are run only occasionally when there are sufficient students interested in and appropriate faculty members are available to teach the courses. In the 2nd year, the students are required to do a major project. These projects are generally experimental in nature; however, theoretical projects are also allowed to interested students with the stipulation that such a student would necessarily take an advanced laboratory among the elective courses. The programme has a very balanced mix of lecture and laboratory courses. The students are also free to choose a minimum of two courses from any other department/centre in the Institute under the open elective category.

M.Tech. Courses

(a) Solid State Materials

Materials play a leading role in various fields of science and engineering. The Solid State Materials programme, which was started in 1965, encompasses science and technology of materials, their synthesis, characterization and applications in devices. With this in mind the Solid State Materials programme has been designed to suit the requirements of various industrial, research and defence organisations of the country where skilled material scientists and technologists are needed. With proper balance between theory and practice, this programme prepares the students to tackle important challenges in various R&D laboratories and industries involved in solid state technology, material science and engineering, and semiconductor technology and processing. Besides, the students are also trained to take up challenges in education. Alumni of this programme are presently occupying key positions in leading material laboratories, international R&D Centres, industries and educational institutions.

(b) Applied Optics

The increased use of optical techniques in almost all branches of science and engineering has created a need of technologists/scientists with specialization in optics. The Applied Optics programme, which has been running in I.I.T. Delhi since 1966 is the only one of its type in the country and 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 in the country and a number of students trained in this programme occupy key positions in various R&D laboratories and industries in the private and public sector.

(c) Optoelectronics and Optical Communication

This Interdisciplinary (offered Jointly by Physics and Electrical Engineering Departments) programme was introduced in 1980, when fiber optical telecommunication was getting developed in the western world and Japan. A comprehensive

M. Tech. progamme of this kind was introduced for the first time in India at IIT Delhi. The courses tought under this programme emphasize on Fiber Optics, Optical Communication Techniques, Information System. Broadband Communication, Semiconductor Optoelectronics, Lasers, Opto Electronics, etc. This program offers R&D skills in the field of Fiber & Integrated Optics and Optical Communication & Networks, that are useful for Industry. Almuni of this M. Tech. program occupy high position in R&D laboratories/organizations and Photonics industries.

Research

The Doctoral and post-doctoral research facilities exist in a variety of fields both in Experimental and Theoretical Physics. These include Interaction of Electromagnetic fields with Plasmas, Dielectrics and Semiconductors, intense Laser-beam Propagation, Laser-Plasma Interaction, Free Electron Lasers, Laser Driven Accelerators, Laser Driven Fusion, Laser Processing of Semiconductors, Laser Raman, Photon Correlation and Modulation Spectroscopy, Femto-second spectroscopy, Remote Sensing, Quantum Statistical and Nonlinear Optics, Optical Solitons, Soliton Switching, Atomic Physics in Strong Laser Field, Optical and Electrical Properties of Organic and Inorganic Semiconductors, Photonic Band Gap Structures, Applied Optics, Holography, Speckles, Optical Data Processing, Fiber Optic Components, Non-linear Fiber Optics, Semiconductor Physics, Solid State Physics, Lattice Dynamics, Phase Transition, Thin Films Science and Technology, Nano-Particles and Non-Structured Materials, High Temperature Superconductors, High Temperature and High Pressure Properties of Materials, Nitride Semiconductors, Transparent Conducting Oxides, Electron Microscopy, Amorphous Materials, Plasma Processing, Solid State Sensors, Optical Memories, Diamond Coatings, Coatings for Wear and Tear Resistance, Amorphous Silicon Devices, Electronic Ceramics. Ferroelectrics, Ferrites, Manganites, Dilute Magnetic Semiconductors, Ferroic Materials, Nano-Magnetism, Nano-Electronics, Nano-Photonics, Optical and Magnetic Datastorage, Spintronics, Semiconductor Technology and Processing, Solar Cells, Quantum Hall-effect, Biophysics, Biological Sensors, Bio-Nano-Magnetics. Microwave Processing of Materials.

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 Science and Technology Laboratory, Magnetics & Advance Ceramics Laboratory, Nano-Stech. Laboratory, Plasma Physics Laboratory, Beam Plasma Laboratory, Fibre and Integrated Optics Laboratory, Laser Spectroscopy Laboratory, Optical Image Processing Laboratory, Quantum Electronics Laboratory. A large number of facilities are available in these and other laboratories and these include: Electron Microscopes (HRTEM, TEM, SEM), Atomic Force Microscope (AFM), Scanning Tunneling Microscope (STM), MOKE Microscope, Scanning Auger Microprobe (SAM), Electron Spectroscopy for Chemical Analysis (ESCA). Secondary Ion Mass Spectroscopy (SIMS), Powder and Thin Film X-ray Diffractometers, XRR, FTIR Spectrophotometer, Laser Raman Spectroscopy System, SQUID Magnetometer, Dielectric and Ferroelectric set-up, Arc-melting, Auto Lab General Purpose Eletrochemical System, Optical Multichannel Analyser, Closed-cycle Helium Cryotip System, High Power Argon-ion/Neodymium/YAG/Excimer/Dye/Ti:Sapphire Lasers, Optical Photon-correlator, Plasma Diagnostics System, VSM Facility, Microwave Processing, Ultrahigh Vacuum Units, Vacuum Coating Units, DC and RF Sputtering Units, Concave Reflection Grating, Spatial Light Modulators, Optical Transfer Function Bench, Holographic Recording Set-up, Coherent Filtering Set-up, Facility for Optical Phase Conjugation with Photorefractives, Facility for Fabrication of Tunnel Diodes, Solar Cells, Thin Film Devices and Integrated Circuits, Optical Fibre Splicing and Characterisation Set-up, In-line Optical Fibre Components Fabrication and Testing, Fabrication and Characterization of Planar Optical Waveguides, Erbium doped fibre amplifiers, Optical Spectrum Analyser, Wavelength Meters, High resolution Microscope, DWDM wave length tuned Laser Diode light sources, Long Period Fiber Grating fabrication, variety of optical fibre sensors, and Facility for Making High Temperature Superconductors, Plasma and Photo CVD Units, DLTS, PL Facility, Optical CD Fabrication Facility.

Ph.D. Research Areas

Experimental and Theoretical Condensed Matter Physics: Thin Film Materials and Devices; Semiconductor Heterostructure, Nano-Materials, Lattice Dynamics; Quantum Hall Effect, Statistical Mechanics of Spin Systems, Surface Growth Phenomena, Bose Condensation, Graphene, Quantum Glasses, Semiconductor and Amorphous Materials, Semiconductor Technology & Processing, MEMS, Electronic Ceramics, Microwave Materials, Microwave Synthesis, Quantum Functional Materials, Spintronics, Nanoelectronics, Nano-Magnetics, Organic-electronics, Superconductivity, Photovoltaics, Nano-Photonic, Laser Spectroscopy and Applications, Laser Processing, Optoelectronics; **Optics and Photonics**: Holography, High Density Data Storage, Liquid Crystals, Nonlinear Phase Conjugation, Optical Information Processing, Optical Data Security Nonlinear Optics, Nonlinear Guided Wave Optics, Solitons, Quantum Optics, Fiber Optics, Integrated Optics, Fiber Optic Sensors and Biosensors; Fiber Optic Components; **Plasma Physics:** Particle Acceleration, Nonlinear Waves & Instabilities in Plasmas, Thermonuclear Fusion, Experimental Plasma Physics, ECR and Helicon Plasma, Plasma Processing; **Theoretical Physics**: Mathematical Physics, Statistical Mechanics and Computational Physics, Nuclear and Particle Physics, Cosmology.

Department of Textile Technology

Professor and Head

Kushal Sen, *Ph.D. (IIT/D)* — Textile Chemistry, Texturing of Synthetics/Natural Fibres and Blends, Special Finishes, Textile Fibres.

Professors

Ashwini K. Agrawal, *Ph.D. (Rochester, NY U.S.A),* — Fibre Science & Technology, Polymers, Stimuli Sensitive Textile Materials, Nano & Bio Materials, Simulation & Modeling.

R. Alagirusamy, *Ph.D. (Georgia Institute of Technology, USA)* — Textile Preforms for Composite Applications, Natural Fibre Composites, Short Staple Spinning, Structure Property Relationship of Yarns.

P.K. Banerjee, *Dr. - Ing. (Tech. Hoch. Karl-Marx-Stadt., Germany)* — Fabric Formation Systems, Technical Textiles.

B.K. Behera, *Ph.D. (IIT/D)* — Fabric Manufacturing Systems, Product Development, Soft Computing, Simulation & Modeling for Fabric Engineering, Apparel Manufacturing, Image Processing and Instrumentation, Sizing, Project Preparation and Evaluation.

R. Chattopadhyay, *Ph.D. (IIT/D)* — Yarn Manufacturing Processes, Statistical Quality Control, Ropes and Cordages, Product Development.

B.L. Deopura, *Ph.D. (IIT/K)* — Fibre Science & Technology, Single Polymer Composites, Water Management through Textile Based Sheet Materials.

Bhuvanesh Gupta, *Ph.D. (IIT/D)* — Biotextiles, Tissue Engineering, Woundcare Systems, Intelligent Polymers & Fibres, Radiation and Plasma Processing, Nano Biotechnology and Nanomaterials.

S.M. Ishtiaque, *Ph.D. (Technical University of Liberec, Czech Republic)* — New Spinning Technologies, Yarns Structure, Machine Design, Textile Management.

V.K. Kothari, *Ph.D. (Leeds University, U.K.)* — Comfort Aspects of Clothing, Technical Textiles, Product Development, Evaluation of Textiles and Quality Management.

Emeritus Fellow

M. L. Gulrajani, *Ph.D. (UDCT, Bombay)* — Colour Measurement, Biomimic Technologies, Theory & Practice of Dyeing.

Associate Professors

Apurba Das, *Ph.D. (IIT/D)* — Yarn Structure, Protective Clothing, Fabric Comfort Nonwovens, Instrumentation.

Deepti Gupta, *Ph.D. (IIT/D)* — Surface Functionalisation, Antimicrobial Finishes, Product Development, Functional Clothing.

Manjeet Jassal, *Ph.D. (IIT/D)* — Functional & Speciality Polymers, Stimuli Sensitive Materials, Biodegradable Polymers, Electrospinning, Nano-Structures using Plasma and Nano-Coatings.

Mangala Joshi, *Ph.D. (IIT/D)* — Polymeric Nanocomposites : Fibers and Coatings, Nanomaterials & Nanocoatings, Functional and Technical Textiles, Environmental Issues and Eco-Friendly Technologies in Textiles.

R.S. Rengasamy, *Ph.D. (IIT/D)* — Yarn Manufacture, Texturing, Garment Technology, Mechanics of Yarns and Machines, Surface Characteristics of Textiles, Clothing and Comfort.

Assistant Professors

B.S. Butola, *Ph.D. (IIT/D)* — Textile Chemical Processing, Polymeric Nano-Composites, Enzymatic Processing of Textiles.

Dipayan Das, *Ph.D.* *(Technical University of Liberec, Czech Republic)*	Nonwoven Products & Processes, Modelling of Structure & Properties of Fibrous Materials.
Sourabh Ghosh, *Ph.D. (Basel Univ., Switzerland)*	Tissue Engineering, Medical Textile, Polymeric Nano-Materials.
Abhijit Majumdar, *Ph.D. (Jadavpur Univ.)*	Yarn and Fabric Production, Textile Testing, Production Management, Soft Computing.
Samrat Mukhopadhyay, *Ph.D. (IIT/D)*	Natural Fibers & Modification Techniques, Fiber Reinforced Composites, Post-spinning Operations.
Amit Rawal, *Ph.D. (Bolton Univ.)*	Nonwovens, Structural Mechanics of Fibrous Assemblies, Technical Textiles.

The Department offers one UG program in Textile Technology and two PG programs in Textile Engineering and in Fiber Science & Technology respectively, besides offering the Doctoral program. For the UG program the department offers 21 core and 26 elective courses over the two semesters while at the PG level 41 courses are on offer. This department, being the only one of its kind in the IIT system, bears the additional responsibility of providing the road map for the growth of other Textile Institutes in India.

The activities are focused on niche and futuristic areas, such as Smart textiles, Nanotechnology applications, Biotextiles, Engineering of functional apparel etc. The Global Interaction of the department has been improving during the past few years. The Asia Link project is a typical example. Under this umbrella, academicians and students from a French (ENSAIT) and a Portuguese Institute (Univ. of Minho) have been visiting this department while simultaneous reciprocal short and long term visits of faculty members and students from this department have also been taking place. Close interaction also exists between this department and the University of Bolton, UK and the University of Liberec of Czechoslovakia which benefits our students in terms of fellowships and Internships as well as faculty members through short term visits. The EU project involves interaction between our students & faculty members and those from EPFL of Switzerland, Uppsala of Sweden, RWTH of Aachen and UC of London in Tissue Engineering. We have started having interaction with a Chinese University (Donghua), a Hungarian Institute (Budapest University of Technology and Economics), a Polish Institute (Institute of Natural Fibers, Poznan), an Australian Institute (CSIRO Fibres and Textiles Technology, Melbourne), Italian Institutes (CNR-ISMAC, Biela and POLITECNICO DI MILANO) a Japanese Institute (Kanazawa University, Japan), a Vietnamese Institute (Hanoi University of Technology) and NCSU of USA with whom we expect to develop mutually rewarding activities in the coming years.

Academic Programmes

Undergraduate

The UG program in Textile Technology is primarily focused on 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.

During the first two semesters, the students take courses in basic sciences, engineering arts and sciences, and humanities and social sciences which are common to students of all disciplines. During the next two semesters, the students take a set of departmental core subjects in Textile Technology. From the fifth semester onwards they opt for departmental elective courses. In the new curriculum, there is increased emphasis on design, product and process development activities. In the final year, students are required to work on a project under the supervision of a faculty member. They also undergo practical training in an industrial establishment as part of their overall engineering education.

Postgraduate

Two M.Tech. programmes - in Textile Engineering and Fibre Science & Technology are offered. The Textile Engineering students are trained for mechanical processing of textile materials, while the Fibre Science and Technology students are trained for the manmade fibre industry as also the chemical processing of textile materials. The students are especially suitable for technical services; research and development work in industry.

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, medical textiles, polymer composites and apparel engineering.

Laboratory Facilities

Fibre Science and Production Laboratory: This laboratory houses a complete range of facilities starting from fiber Production to fiber Characterization. It is fully equipped for producing and characterizing all kinds of polymers and fibers. It hosts a complete range of optical microscopes with a capability of measuring birefringence. Recently, an image analysis system has been added which is attached to a new generation Lieca polarizing microscope. It is also equipped with complete thermal analysis system such as Differential Scanning Calorimeter (DSC), Thermo Gravimetric Analyser (TGA), and Thermo Mechanical Analyser (TMA). Mettler apparatus for thermal microscopy is also available for study of transition properties. Melt Flow Index Apparatus, and Brookfield cylinder in cylinder rheometer are available for viscosity measurements of polymer melts and solutions. Micro Fourier Transformed Infra Red (FTIR) spectroscopy and table top FTIR from Perkin Elmer with peak analysis software is available for structural analysis. Wide angle X-ray diffractometry from PAN-analytical India is capable of analyzing fiber orientation and crystallinity. The laboratory also has sonic modulus analyzer, density gradient column, micro balances, and moisture measurement apparatus and a tensiometer for contact angle measurement. Laboratory hosts facilities for polymerization of polymers from small to pilot scale. A pilot high temperature, high pressure reactor plant is capable of carrying out reactions upto 1.5 kgs. Fibre production units are capable of wet, dry-wet and melt spinning of fibres. The laboratory includes indigenously designed tape-cum-monofilament production systems with hot and cold drawing and heat-setting attachments. “Betol” extruder is available for producing polymer blends. Fourne high speed Melt Spinning Unit is capable of producing filaments comparable to the industrial units with speeds up to 6000 m/min. A new fiber science research lab has been set-up. A micro twin screw compounder from DSM, Netherlands and an electrospinning facility has been installed in this lab. Carbon Precursor Facility is equipped with a solution spinning line in a clean room environment for producing high tenacity carbon precursor filaments. Compression moulding press, high temperature furnaces, drawing units is available for processing polymers and fibers into desirable end products. A gamma chamber 900 with a Cobalt 60 source is available for grafting studies. A low pressure plasma unit is also available for plasma treatment of fiber and fabric surfaces.

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 false twist and air texturised yarns can be produced. Facilities exist for reeling hank yarns from cheese/cones and doubling of yarns using ring doublers. For small-scale sample production, Platts Miniature spinning plant is also available. Spinning Research Laboratory has two laboratory scale rotor-spinning machines and a DREF-III Friction spinning machine.

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, sectional warping machine with all controls and Zell laboratory high pressure sizing machine with controls for speed, squeeze pressure and temperature. Attachments such as residual moisture measurement system, wet pickup measurement system and stretch monitoring system are also available. Research facilities for characterization of size materials and evaluation of sized yarn on Reutlingen webtester are available. In weaving section- projectile, rapier, airjet and waterjet 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, and carpet loom. Weaving section is also equipped with a CAD station system for both woven and printed design. Knitting section includes flat knitting machines, circular knitting machines such as single jersey, rib and interlock with needle selection systems and a narrow width double needle bed eight bar Raschel machine. Development of a Nonwovens Research laboratory is under progress. Industrial sewing machines constitute the garment technology facility. Braiding machine for producing wick drains also exists in the department.

Textile Chemical Processing: Housed in this laboratory are lab-scale versatile equipment for chemical processing of textile fabrics, yarns and fibres. Controlled experiments starting from preparatory processes, dyeing, printing and finishing including coating, can be performed in this laboratory. In addition, the laboratory contains relevant analytical / testing equipment for assessing performance of the treatments imparted to the textiles including computer colour matching systems, spectrophotometers, fastness 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, package dyeing and roller printing machine. Light fastness tester, launderometer, moisture vapour permeability tester, air permeability tester and flammability tester are also present. Housed in this laboratory are lab-scale versatile equipment for chemical processing of textile fabrics, yarns and fibres. Controlled experiments starting from preparatory processes, dyeing, printing and finishing including coating, can be performed in this laboratory. In addition, the laboratory contains relevant analytical / testing equipment for assessing performance of the treatments imparted to the textiles including computer colour matching systems, spectrophotometers, fastness 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, package dyeing and roller printing machine. Light fastness tester, launderometer, moisture vapor permeability tester, air permeability tester and flammability tester are also present.

Textile Testing Laboratories of the department has modern instruments for testing various types of fibers, films, yarns, fabrics (woven, non-woven and knitted) and carpets. Standard atmospheric conditions of temperature and humidity i.e. temperature of $27^0 \pm 2^0$ C and 65%±2% R.H. are maintained in the lab through sophisticated controls. Fibers can be tested for single fibre and bundle strengths, breaking extensions and yarn can be tested for mass irregularity (U% or C.V %) imperfections, spectrogram, hairiness, twist, yarn to yarn friction and abrasion resistance. The yarn can also be subjected to cyclic load to evaluate various parameters like strength loss, elastic recovery and creep etc. 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. Carpets can also be tested for thickness loss due to abrasion, dynamic loading and tuft withdrawal force.

Computers and CAD Lab: Facilities in these labs are used by students for course work, internet search, preparing reports, analyzing test data and preparing presentations. CAD lab is used for developing designs for woven and knitted fabric. Software for Garment Pattern making, Grading and Marker making are also available.

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 and ameliorate 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 applications in the fields of filtration, coated materials, geotextiles, protective clothing, sports textiles and medical textiles. From a water repellent jacket, parachute sample, a Kevlar ballistic suit, electronic shielding textiles to perfobond samples, the collection is extensive and growing every day.

Ph.D. Research Areas

Textile Engineering: Analysis and design of yarn and fabric formation systems such as rotor spinning, friction spinning, weaving, knitting, braiding etc., Structural mechanics of yarns, knits, woven, braided and Nonwoven materials; comfort, handle and other functional aspects of fibrous assemblies, Design and development of technical textiles such as Geotextiles, filter fabrics, medical textiles, packaging textiles etc., systems analysis, textile production and marketing.

Fibre Science and Technology: Synthesis and characterization of advanced polymeric materials. Structure property correlation, Functional polymers and systems , Stimuli responsive polymers and Phase change materials for heat storage, Modification of natural and synthetic fibres , Nanofibers by electrostatic spinning, Polymeric Nanocomposites, Nanoclay based coatings and composites, Nano engineered fire resistant composite fibres, Biomedical applications of Textiles, Sustainability and polymer recycling, Modeling and simulation, Green composites, High stress elastic materials (ropes/braided structures).

Textile Chemical Technology: Chitosan chemistry and application, Isolation and application of sericin, Surface fictionalization by plasma and UV Excimer lamp, Micro-encapsulation and Nano encapsulation, Processing of bamboo fibres, Natural dyes, Dyeing and finishing, Conducting fabrics, Bio-active fabrics, Textile ecology and environment.

Centre for Applied Research in Electronics

Professor and Head

Suneet Tuli, *Ph.D. (IIT/D)*	Nondestructive Characterisation, Thermography & Thermal Imaging System.

Professors

R. Bahl, *Ph.D. (IIT/D)*	Sensor Signal Processing, DSP System Design, Underwater Acoustics, Bio-Acoustics.
Sudhir Chandra, *Ph.D. (IIT/D)*	Microelectronics Technology, MEMS Technology, Sensors and Actuators.
S.K. Koul, *Ph.D. (IIT/D)*	Microwave and Millimeter Wave Engineering, Antennas and RF MEMS.
Arun Kumar, *Ph.D. (IIT/K)*	Digital Signal Processing, Speech, Audio and Underwater Acoustics.
B.S. Panwar, *Ph.D. (IIT/D)*	SAW Device Design & Modelling and Heterostructures.

Associate Professors

Monika Agarwal, *Ph.D. (IIT/D)*	Signal Processing, Communication, Sensor Array Processing and Underwater Acoustics.
Ananjan Basu, *Ph.D. (Univ. of California)*	Microwave and Millimeter-wave Engineering.
Manish Sharma, *Ph.D. (Stanford Univ.)*	Magnetic Nanostructures, MEMS and Biological Sensors.

Assistant Professors

Mahesh. P. Abegaonkar, *Ph.D. (Pune Univ.)*	Microwave Engineering, Antennas.
Vikas Rana, *Ph.D. (Delft Univ. of Tech., Netherland)*	Organic Electronics, OTFT, OLED, Solar Cell.

The Centre has strong and focused research activities in the areas of (i) Signal processing, underwater acoustics, (ii) Microwave and Millimeter Wave Integrated Circuit Design, modelling of RF MEMS, (iii) Microelectronics technology, SAW based subsystem design, sensors, actuators and MEMS technology and (iv) Non destructive characterization and systems. The Centre has major sponsored projects in these areas which are funded by DRDO, DST, Indian Navy, R&D Laboratories and Industries. Many of these projects are technology development oriented leading to specific technology transfer to the user agencies.

Areas of Research & Development

1. **Signal Processing**

   Sonar Signal Processing.
   Speech and Audio Signal Processing.
   Transducer Arrays.
   Array Processing.
   High Speed Digital Signal Processing Hardware and Architecture.
   Underwater Acoustics.
   High Resolution Sonar.
   Intelligent Sensor Systems.
   Digital Communication.

2. **RF and Microwaves**

   Microwave Integrated Circuits and Technology.
   Millimeter Wave Integrated Circuits and Technology.
   Linear and Non-linear Modelling of Passive and Active Microwave & Millimeter Wave Integrated Circuits.
   Passive and Active Antennas at Millimetre Wave Frequencies.
   Radio Frequency MEMS.
   Modelling of RF Microwave Active Devices.
   RFID.
   Broadband Millimeter Wave Circuit Development.

3. Microelectronics

Microelectronics Technology.

Silicon Sensors and Actuators.

MEMS.

Computer Aided Design and Fabrication of Surface Acoustic Wave Devices.

Thermal-Acoustic-Optical Non-destructive Evaluation.

Organic electronic, OTFT, OLED, Solar Cell.

Magnetic Nanostructures, Biological Sensors.

Laboratory Facilities

Signal Processing Laboratory : Fully equipped with modern equipments to carry out research in Analog, Digital and Microprocessor-based Signal Processing Techniques. The laboratory consists of Microprocessor Development System, Digital Storage Oscilloscope, Frequency Synthesizer, Function Generator, Spectrum Analyzer and other general purpose test and measurement equipment.

DSP Laboratory : Equipped with number of PCs with Simulation Tools for DSP Design.

Speech and Audio Processing Laboratory: The Laboratory is equipped with computational facilities, audio amplifier system and speech and audio signal processing software's. The lab facilitates auditory perception experiments in low ambient noise environment.

Underwater Electronics Laboratory: The laboratory has water tank, Hydrophones, projector, data acquisition system and associated test instrumentation for testing of under water transducers and arrays.

Microwave and Millimeter Wave Testing Laboratory : The laboratory has four Automatic Network Analyzers up to 8 GHz, 20 GHz, 40 GHz and 110 GHz and a Spectrum Analyzer to 40 GHz. 5 licensed copies each of HFSS and ADS of M/S. AGILIENT, USA, 5 licences of CST Studio and two licenses of HFSS and Designer from M/S ANSOFT Corporation, USA are installed in the laboratory. In Addition, the laboratory has Fidelity and IE3D software tools from Zeeland Corporation, USA, Anechoic chamber, Cryo-cooler, RF probe station.

National Resource Centre on MEMS Design: This has been recently set up under funding from NPMASS. The Lab. houses latest tools for MEMS Design. These includes : Coventorware, Comsol and Intellisuite.

MIC Laboratory: The MIC Laboratory has a RF sputtering system, Vacuum evaporation unit, Mask aligner, Spinner, Photo plotter reduction camera, Thermosonic bonder and soldering stations.

Advanced FITT MEMS CAD Laboratory: The Laboratory will house softwares for designing MEMS at RF frequencies. The softwares installed are: MEMS PRO, HF Works, EMS and MMI CAD.

Microelectronic Laboratory: The Microelectronics Lab has modest facilities for unit processes for IC fabrication. These include : diffusion, oxidation, mask making, photolithography, reactive ion etching, dielectric and metal deposition and characterization tools. The fast prototyping of Micro-Electro-Mechanical Systems (MEMS) device fabrication is now a focused activity of the lab.

Non- destructive Systems Laboratory: An automated non-destructive characterization facility with emphasis on photo acoustic and photo thermal techniques caters to micro as well as macro applications is installed in the laboratory. A high frame-rate thermal camera for Non-destructive testing is used for active and passive thermography.

Central Computing Facilities: Apart from the area specific CAD and computing facilities available with in the three groups, the Centre has the central computing laboratory that provides networking and electronic mail services. The laboratory also has software's like FORTRAN, Visual C, Auto CAD, Microsoft Office, Exceed, PSPICE, ORCAD Capture etc. installed. A powerful Pentium PC is used for multimedia and Internet facilities.

Ph.D. Research Areas

Microelectronics Technology and MEMS, Surface Acoustic Wave Devices, Computer Aided Design of Low Loss SAW Filters. Microwave and Millimeter Wave Engineering and Computer Aided Design, Signal Processing, Digital Hardware Design, Underwater Electronics, Planar Antennas, RF MEMS, Acoustic Image Processing Digital and Communication Systems, Speech and Audio Signal Processing, Thermo-acoustic-optical Non-destructive Characterization and Silicon Sensors and Actuators, Organic electronic, OTFT, OLED, and Solar Cell.

Centre for Atmospheric Sciences

Professor and Head

Om P. Sharma, *Ph.D. (IIT/B)*	Ocean-atmospheric Circulation Modelling, Aerosols & Atmospheric Chemistry, Computational Fluid Dynamics, Methods of Applied Mathematics.

Professors

S. K. Dash, *Ph.D.(PRL,Gujarat)*	Climate Modelling, Monsoon Studies, Parallel Processing in Climate Models.
S. K. Dube, *Ph.D.(Lucknow University)*	(onlien) Coastal Oceanography, Storm Surges, Wave Modelling.
Pramila Goyal, *Ph.D. (Roorkee)*	Air Pollution Modelling, Environmental Management, Environmental Impact Assessment .
Girija Jayaraman, *Ph.D. (IISc., Bangalore)*	Bio Fluid Dynamics, Mathematical Methods, Marine Ecology, Biological Oceanography.
U.C. Mohanty, *Ph.D. (Moscow)*	Tropical Meteorology, Numerical Weather Prediction, Monsoon Dynamics, Climate Modelling.
Manju Mohan, *Ph.D. (IIT/D)*	Air Pollution Modelling, Environmental Impact Assessment, Risk Assessment Techniques, Atmospheric Chemistry.
A. D. Rao, *Ph.D. (IIT/D)*	Physical Oceanography, Coastal Ocean Circulation, Ocean Wave Modelling.
Maithili Sharan, *Ph.D. (IIT/D)*	Air Pollution Modelling, Atmospheric Boundary Layer, Physiological Fluid Dynamics, Computational and Mathematical Methods.

Sir Gilbert Walker MoES Distinguished Chair Professor(Visiting)

T.N.Krishnamurti, *Ph.D. (Chicago)*	Global Monsoons, Monsoon Oscillations, Hurricane Modelling, Multi-Model Weather and Claimate Predicitions, Tropical Meterology.

Associate Professors

Krishna Achuta Rao, *Ph.D. (Tulane Univ. USA)*	Climate, Climate Modelling and Validation, Climate Variability, Climate Change Detection and Attribution, Ocean Heat Content, Sea-level Rise, Air-sea Heat Transfer, Climate Data Analysis Tools.
H.C. Upadhyaya, *Ph.D. (IIT/D)*	General Circulation Modelling (Atmosphere and Ocean), Data Assimilation, Adjoint Modelling.

Senior Scientific Officers-I

Poornima Agarwal, *Ph.D. (Srinagar Univ.)*	Environmental Chemistry, Monitoring and Laboratory Studies, Observation and Data Analysis.
R.C. Raghava, *Ph.D. (IIT/D)*	Numerical Modelling of Atmospheric Processes, Land Surface Processes & Applied Mathematical Techniques, General Circulation Modelling.

The Centre for Atmospheric Sciences was established in the Institute in May 1979 with a view to developing an active group in Meteorology, Oceanography and Environmental Studies, which was later upgraded by the then Ministry of Education as an Advanced Centre under the sixth five-year plan. The Centre is co-sponsored by the India Meteorological Department on cost-sharing basis. The M.Tech. Programme in "Atomshperic-Oceanic Science and Technology" of the centre is supported by the Ministry of Earth Sciences under an MoU.The major areas of research in the Centre include monsoon studies, general circulation and climate modelling; limited area models, tropical cyclones and storm surge models; ocean modelling, coupled ocean-atmospheric modelling, meso-scale modelling, environmental studies, air-pollution studies, risk assessment techniques related to accidental release of toxic chemicals.

The Centre has 13 core faculty members, a visiting faculty for "Sir Gilbert Walker MoEs Distinguished Chair Professorship" and about 40 project scientists. The multidisciplinary teams of highly qualified scientists include meteorologists, oceanographers, physicists, chemists, applied mathematicians, etc. The Centre offers several courses at Ph.D., M.Sc., M.Tech., B.Tech. levels; and the Post-Graduate programme leading to M.Tech in "Atmospheric-Oceanic Science and Technology".

Laboratory Facilities

The Centre has developed several infrastructural laboratories including one for High Performance Computing (HPC) for carrying out its research programmes. These include computing laboratories which house IBM P-570 Series, 16-Node Cluster, SuperMicro Storage Tyrone, and Apple desktop computers; an air pollution laboratory and a laboratory to monitor vehicular pollution. The center has also got a weather monitoring display system. The Centre has a rich library with latest collection of books and printed materials in the relevant areas of research. The centre has created a very modern M.Tech. lab for Satellite image processing which has image analysis and interpretation with the ERDAS system. The 10 year twice daily ECMWF Weather Analysis is available to student and faculty for their research and modeling work.

Active collaborative programmes of research have been developed by the Centre with various universities and centres of excellence in France, Great Britain, USA, Japan and Russia. The Centre has close and fruitful collaborations with scientists of other institutions in India, viz., India Meteorological Department, National Centre for Medium Range Weather Forecasting, Indian Institute of Tropical Meteorology, Pune; Space Application Centre, Ahmedabad; Indian Air Force (Meteorology Directorate), and Indian Navy (Meteorology and Oceanography Directorate).

Ph.D. Research Areas

Meteorology, Oceanography, Air Pollution Studies and Climate Change.

Post- Graduate Programme

M.Tech. in "Atmospheric- Ocenic Science and Technology".

Centre for Biomedical Engineering

Professor and Head

Sneh Anand, *Ph.D. (IIT/D)*	Biomedical Instrumentation, Rehabilitation Engineering, RF Imaging, Sensors, Biomechanics, Technology in Reproduction Research and Integral Health Care, Drug Delivery Systems.

Professors

Dinesh Mohan, *Ph.D. (Michigan)*	Biomechanics, Human Tolerance to Injury, Safety Research, Ergonomics.
Alok R. Ray, *Ph.D. (Delhi)*	Biomaterials, Biodesign, Vaccine & Drug Delivery.
Harpal Singh, *Ph.D. (IIT/D)*	Biomaterials, Synthetic Polymers for Biomedical Applications.

Associate Professor

Veena Koul, *Ph.D. (Kashmir)*	Biomaterials, Drug Delivery Systems, Medicinal Chemistry and Polymer Chemistry.

Principal Scientific Officer-I

Nivedita K. Gohil, *Ph.D. (IIT/D)*	Vascular Mechanics, Cardiovascular Physiology, Biosensor Technology Applied to Clinical Diagnostics.

Senior Design Engineer

S. M. K. Rahman, *M.Tech. (Allahabad)*	Biomedical Instrumentation.

Adjunct Faculty

Amit Sengupta, *MBBS, MD(Obsgyn.), Ph.D.(IIT/D)*	Integrated Multi Disciplinary Biomedical Research and Technology Development for Comprehensive Mass Health Care in Priority Areas, Reproductive Bioengineering, Vascular Research, Imaging and Telemedicine.
Sakti Srivastava, *MBBS (AIIMS), MS (Ortho) (AIIMS)*	Medical and Surgical Simulations, Networked Application in Medicine, Medical Devices and Instrumentation.

The Biomedical Engineering Centre at IIT Delhi is offering postgraduate programme Ph.D. degree in Biomedical Engineering. This programme is jointly supported by the IIT Delhi and All India Institute of Medical Sciences, New Delhi. The Centre has a faculty drawn from both these Institutes. In addition, the Centre has also collaborative projects with other major hospitals in India.

The programme is interdisciplinary. While the prime focus of Biomedical Engineering is on utility, it combines clinical emphasis with strong commitment to basic research. Collaborative research with expertise in the IIT and AIIMS is given priority.

The areas of research and development of the Centre include :

(a) Medical Electronics, (b) Biomechanics, (c) Biomaterials, (d) Computers in Medicine, (e) Rehabilitation Engineering, (f) Technology in Mass Health Care, (g) Bioengineering in Reproductive Medicine, (h) Physiological System Analysis and Modelling, (i) Prevention and Control of Injuries (j) Drug Delivery Systems, (k) Membrane Transport Mechanisms.(l) Study of Orthopaedic Devices.

Focus areas of research and development are :

(a) Rehabilitation Engineering, (b) Bioengineering in Reproductive Medicine, (c) Biomedical Electronics, (d) Biomaterials, (e) Injury Control and Safety, (f) Cardiovascular Physiology, (g) Biosensors, (h) Drug and Vaccines Delivery Systems, (i) Artificial Implants & Membrane Transport Mechanisms, (j) Implants & Prostheses, (k) Tissue Engineering, (l) Blood Compatible Polymers, (m) Medical Diagnostics.

Under the Drugs and Cosmetics Act the Centre is the National Statutory Laboratory for the Assessment of some contraceptive devices. It is also recognised as a WHO Collaborating Centre for research and training in Safety Technology.

Academic Programmes

Courses relevant to Biomedical Engineering offered at IIT and the All India Institute of Medical Sciences, New Delhi, include Bio-mechanics, Medical Electronics, Introduction to Biomedical Instrumentation Systems, Bioengineering and Biocontrol, Computers in Biomedicine, Research Techniques in Biomedical Engineering, Ergonomics and Work Design, Biomaterials, Biopolymers, Biophysics, Biochemistry, Elementary Biosciences, Physiology, Anotomy, Introduction to Safety Principles to Engineers, Industrial Biomaterial Technology, Biosensor Technology, Orthopaedic Biomechanics.

The Centre also offers the following programmes :

(a) Project guidance for B.Tech., M.Tech., M.B.B.S., M.S. and M.D. Courses.

(b) Ph.D. in Biomedical Engineering: Current areas of research are Bioinstrumentation, Biosensors, Physiological Signal Analysis, Modelling of Human Functions, Polymeric Implant, Sustained and Enhanced Drug Delivery Systems, Injury Mechanisms, Mechanical Properties of Biological Tissues and Organs, Brain Mechanics, Rehabilitation Research, Aids for Disabled, Biomedical Engineering Applied to Reproductive Biology and Family Welfare and Biomedical Transducers, Biocompatible Polymers, Orthopedic Biomechanics, Vascular Mechanics, Tissue Engineering, Medical Diagnostics.

(c) Consultancy services to industry and other organisations in the areas specified above.

(d) Short-term courses for professionals from industry and staff from engineering and medical Institutes.

Laboratory Facilities

The Centre has Bioelectronics, Vascular Mechanics, Biomechanics, Biomaterials, Biosensor, Preventive Cardiovascular, Medical Devices Evaluation, Animal Experimentation and Biosignal Processing Laboratories a dynamic Orthopaedic Impact testing facility, Instrumented Dummy for testing burn properties of fabrics and a Mechanical Workshop.

Ph.D. Research Areas

Bioelectronics Medical Electronics Rehabilitation Engineering-Digital Signal Processing, Medical Imaging. Biomechanics-Injury Biomechanics, Ergonomics, Vascular Mechanics, Biomaterials-Synthesis and Characterization of Biomedical Polymers, Controlled Delivery of Drugs and Vaccines, Biosensors, Orthopaedic, Biomechanics, Tissue Engineering.

Computer Services Centre

Professor and Head

Subhashis Banerjee, *Ph.D. (IIS. Banglore)*	Computer Vision, Real Time Systems, Robotics.

Manager (SG) & Associate Head

N.C. Kalra, *M.Tech. (IIT/D)*	Networking, Internet Computing, System Programming, Microprocessor Based System Design.

Sr. System Programmers

***P.K. Baboo,** *Ph.D. (Behrampur)*	Database Management Systems, System Analysis and Design, System Administration.
Savita Goel, *Ph.D. (IIT/D)*	System Programming & Administration, Computer Graphics, CAD Administration, Parallel Computing.
***P.K. Gupta,** *M.Tech. (IETE)*	Database Management Systems, System Analysis and Design, System Administration.
****S.R. Hegde,** *Ph.D. (IIT/D)*	CAD/CAM/CAE Service.
Pragya Jain, *Ph.D. (IIT/D)*	Parallel Processing, Grid Computing, Systems Administration, Numerical Analysis.
***K. Narayanan,** *M.Sc. (Delhi University)*	Database Management Systems, System Analysis and Design, System Administration.
***R. Raghavan,** *M.Sc. (IIT/D)*	Database Management Systems, System Analysis and Design, System Administration.

Senior Programmers

Rajesh Bhat, *Ph.D. (IIT/D)*	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)*	Networking & Systems Administration.
Jaya, *M.Tech. (IIT/D)*	System Administration, Application Software, Object Oriented Programming, Programming Languages, DBMS.
Sunil Kak, *M.Tech. (IETE)*	Systems Administration and Management.
Gopal Krishen, *M.Sc. (Kurukshetra Univ.)*	Hardware, Networking, System Administration, Database Management System and DBA.
Ram Lal, *Ph.D. (JMI)*	Object Oriented Programming, System Administration, Information Technology E-Governance, MATLAB Programming, Image Processing.
Jayashree Santhosh, *Ph.D. (IIT/D)*	System Software and Technology Applications.

***** *Posted to ACSS Unit*

****** *Posted to APP. Mech.Department.*

The main objectives of the Computer Services Centre are to :

- provide round the clock computing and networking facilities.
- provide advice to all members of IIT on all aspects of academic computing.
- implement and maintain system and application software.
- impart introductory and advanced instructions to users.
- generate trained manpower in the IT area.
- interaction with industry.
- provide advice, implement and manage the Institute Network.
- provide support to Institute computerization efforts.
- do in - house research and development.
- serve a user population of more than 7000 users consisting of undergraduate and postgraduate students, research scholars, faculty and staff of the Institute.

In addition, the centre also participates in the Academic programmes of various departments, undertakes Sponsored Research and Consultancy Projects and Conducts CEP Courses in several topical areas of Information Technology.

General Computing Facilities

The Centre is equipped with 18+1 node dual CPU Sun Linux cluster, Sun fire 6800, CAD Graphics facility, Fourteen rack mounted HP ProLiant Server Blades, 4 TB SAN, 22 TB SUN NAS, 32 Blade Servers with 30 TB HP SAN storage and about 220 desktops connected over a switched fast Ethernet. Uninterrupted Power Supply is provided through 3x80 KVA MGE UPS system and DG set.

PARALLEL/GRID COMPUTING (LINUX CLUSTER)

The Linux cluster is connected to National GARUDA Grid over National Knowledge Network (NKN).

Hardware (Garuda Cluster)

- One Master/Frontend node
- SUN Fire x4200, 2x2.6Ghz, 4GB RAM, 4x73GB SAS
- 18 Slave/Compute nodes
- SUN Fire x4100, 2x2.6Ghz, 2GB RAM, 1x73GB SAS
- 24port 3COM Gigabit switch
- Avocent KVM switch (16 port), 36U Rack
- 15 TB NAS (SATA + FC) usable

Software

- OS-Linux x86-64
- CMS-Rocks
- Security- Area51 (firewall, tripwire, chkrootkit)
- Bioinformatics utilities – (HMMER, NCBI BLAST, MpiBLAST, BIOPYT, ON, CLUSTALW, MrBAYES, T-COFFEE, EMBOSS, PHYLIP, FASTA GLIMMER)
- Condor- High throughput computing tools
- Ganglia – Cluster monitoring system from UCB
- Grid – Globus 4.0.2 (GT4)
- Java – Sun Java SDK and JVM
- PBS – Portable Batch System
- Pvfs2 – Parallel Virtual File System 2
- SGE – Sun Grid Engine job queuing system.

Sunfire 6800 High Performance System

The two domains of the 24 processor Sunfire 6800 support computation intensive and high-end research projects with high performance computing tools and state-of-art engineering software packages. It is a multi domain system. Presently two domains are configured as sunfire 0 and sunfire 1 with 16 and 8 processors respectively. E-220R, a backup server was gifted to the Institute by Sun Microsystems.

Hardware Configuration:

- 24 Processors x Ultra Sparc III, 900 MHz each with 8MB cache.
- 24GB RAM, 72 GB Internal SCSI disc.
- 4 x Fast Ethernet NIC Gigabit Ethernet NIC.
- 655 GB Sun Storage Fibre Channel storage 2 x T3 arrays RAID Storage.
- Enterprise 220-R backup system with Solstice Backup, Robotics License.

- 9 slot LTO Tape Drive Autoloader.
- 4 TB SAN (3TB Usable).

Softwares:

- SUN HPC Cluster tools 4.0, Sun Grid Engine.
- Forte developer for HPC V6 with C++, Fortran compilers.
- Visual tool Sun Workshop, Solaris Resource Manager 1.2.
- MPICH V 1.2.4 Parallel Processing Software.

Advanced Engineering and Scientific Software Packages:

- MATLAB Version 2010a
- MATHEMATICA V4.1 (unlimited users server license).
- ANSYS Release 9.0
- ABAQUS 6.3.1.
- CANDENCE VLSI Design Tools.
- Connectivity via Citrix ICA Client, Meta frame 1.1/1.8 (100 licenses).
- Silvaco Software for Circuit Design.
- Lindo Software for Optimization.

CAD Graphics Facility

The CAD facility consists of ten Dell Workstations and a Dell Server.

Hardware Configuration of Dell Workstations (no. 10):

- Intel Xeon 5160 3.0 GHz Dual Core
- 5000X chipset
- 2GB RAM
- 256 PCIx16 NVIDIA Quadrofx-3450 video card
- 250 GB SATA HDD (7.2 K RPM)
- 19" TFT monitor
- Gigabit Ethernet controller
- 16x DVD Writer
- Windows Vista (32 bit)
- Dell keyboard
- Optical mouse.

Hardware Configuration of Dell Server:

- Intel Xeon Dual Core (64 bit) 7120M 3.0 GHz
- 4MB L3 cache
- 2x300 GB SCSI HDD
- CDRW/DVD Combo drive 24x max
- 15" LCD monitor
- Gigabit Ethernet controller
- Redundant Power Supply
- SUSE Linux Enterprise Server 10 EM64T 32 CPU
- USB 104 keys keyboard
- USB mouse

FEA / CAD / CAE Software:

- Ansys
- Abaqus
- Silvaco Atlas
- Lindo
- Fluent
- Cadence
- SNNS Neural Network software

HP PROLIANT SERVER BLADES (Nos. 14):

7 Blades consists of:

- Dual core Intel 5100 Series Xeon 2.33 GHz
- 1333 MHz FSB
- 4GB RAM
- 292 GB HDD

5 Blades consists of:

- 2-Quad Core Intel 542-Quad core intel 5420 Xeon 2.57 GHz
- 1333 MHz FSB
- 8GB RAM
- 292 GB HDD

2 Blades consists of:

- 2 Dual core 2000 series AMD 2.4 GHz
- 584GB HDD
- 8GB RAM

OS: Linux / Windows Server 2008

Applications :

- Windows Deployment & Update Services
- Anti-virus Services
- Windows Domain Controller
- DHCP Services
- Microsoft Updation and Distribution Services
- E-mail Services

HP SAN STORAGE (30 TB) & Servers

32 HP Proliant BL460c Blade Servers installed in 2 Racks each with

- 2x Quad core E5540 (2.53 GHz, 8MB L3 cache)
- 12 GB DDR3 RAM
- 2x300 GB 10K RPM Disk
- 2x autosensing !) GbE Ether adaptor

HP Storage works MSL 4048 Tape Library

Web Services

The web-service is provided through Virtual Machines (VMs) hosted in Blade Servers having Linux Operating System. These serivce are divided into five sections:- global: www.iitd.ac.in, internal: internal.iitd.ac.in, faculty web pages: web.iitd.ac.in, for student activites: paniit.iitd.ac.in and for Computer Centre: :www.cc.iitd.ac.in.

Engineering and Technical Computing Software Network Licenses

The following software are available with Network licenses for installation & use on departmental systems & hostel PCs:

MATLAB Technical Computing Environment provides core and advanced mathematical and graphical tools for analysis, visualization, and algorithm and application development. Matlab Release 2010a is available with the toolkits and number of licenses as listed below:

Software	Licenses	Software	Licenses
MATLAB	100	Fuzzy Logic Toolbox	11
SIMULINK	50	Image Processing Toolbox	16
Curve Fitting Toolbox	5	Neural Network Toolbox	16
Communication Toolbox	11	Optimization Toolbox	10
MATLAB Compiler	10	PDE Toolbox	06
Control System Toolbox	10	Power System Blocks	10
Data Acquisition Toolbox	05	Signal Processing Toolbox	15
Signal Processing Blockset	10	Symbolic Math Toolbox	11
Extended Symbolic Toolbox	06	Statistical Toolbox	05
Wavelet Toolbox	10	Genetics Algorithm Toolbox	05
Bioinformatics Toolbox	05	Sim Power Systems	10
Sim Events	05	Distributing Computing	10
State Flow	05	Simulink Control Design	10
Spline Toolbox	05		

PC Services

There are five PC Labs in the Centre having about 220 Desktop computers under Windows XP/ Vista/ Windows 7/ Linux environment. Multimedia projection facility is also provided in three PC Labs for taking practical classes.

Network Services

The Institute LAN is a state of the art switched network with Fibre Optics and enhanced CAT5/CAT6 UTP backbone. It consists of more than 6500 network access points spread using 158 Cisco switches, 6 routers and 65 virtual LANs. The 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, 4x2Mbps leased circuits from VSNL, 1x2 Mbps circuit from ERNET and 1x STM1 from Reliance (trifurcated into 72 Mbps for Academic, 34 Mbps for ETSC and 34 Mbps for Hostels). Internet and Intranet access is provided from faculty/ officer homes using 56 dialup modems, and ADSL connectivity over internal telephone lines. The academic area is also connected through secure Wi-Fi. An independent network has been provided for the administrative functions . Many network services including mail, web, domain name, anti-virus are being provided over this network. IIT Delhi network is connected to the National Knowledge Network (NKN) with 1Gbps dual connectivity from PowerGrid and RailTel. This connectivity provides virtual routing service for Garuda Network, Internet Connectivity, and connectivity with other Institutes connected also with NKN backbone.

Educational Technology Services Centre

Professor and Head

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

In addition, the Centre has a Core Group of Faculty comprising of :-

Ashok Gupta, *Ph.D. (IIT/D),* Department of Civil Engineering.
Arun Kanda, *Ph.D. (IIT/D),* Department of Mechanical Engineering.
R.K. Mittal, *Ph.D. (Johns Hopkins),* Department of Applied Mechanics.
Kushal Sen, *Ph.D. (IIT/D),* Department of Textile Technology.
Sanjeev Sanghi, *Ph.D. (City Univ. of New York),* Department of Applied Mechanics.

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 of activities are:

- Design & Development of Instructional Resources: In the form of 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.
- Transmission of an independent 24 x 7 EKLAVYA technology channel.
- Telecast video courses under NPTEL programme on EKLAVYA.
- Administration of ACADO Server (LMS).
- Offer support for classroom teaching.
- Dissemination of Instructional Resources: through development of information brochures and databases.

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. Non linear 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 nomial price throughout the country and abroad.

The Centre conducts short courses and modular programmes on different aspects of educational technology for teachers and staff from the Institute and from other educational institutions and industry institutions. These courses are designed to sensitize and guide the faculty to optimize their effort and time for classroom and laboratory instruction as well as professional development.

The Centre offers its services to departments, individual faculty or groups of faculty members in revising, redesigning and innovating curricula.

The Centre has the expertise and experience of undertaking national and international level consultancy and sponsored research projects. It has worked with agencies such as the World Bank, AT&T, AICTE, UNESCO, UNDP Commonwealth of Learning, The British Council and Adis Ababa University, Eithopia.

The NPTEL project funded by MHRD 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 undergradutes courses intially 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 has also started 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 facilites 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 as temporary structures 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).

Centre for Energy Studies

Professor and Head

S.C. Kaushik, *Ph.D. (IIT/D)*	Thermal Science and Engineering, Solar Energy Utilization, Energy Conservation and Heat Recovery, Solar Refrigeration/Airconditioning and Power Generation, Solar Architecture, Heat Transfer and Thermodynamics, Thermal Energy Storage and Power Generation, Plasma Physics and Fusion Energy, Electro Magnetics, MHD Power Generation.

Professors

M. K. Gajendra Babu, *Ph.D. (IIT/M)*	Emission Control, Instrumentation and Computer Simulation, Alternative fuel I.C. Engines.
R. Balasubramanian, *Ph.D. (IIT/K)*	Electrical Power Systems, Planning, Operation & Control, Energy System Planning.
T. S. Bhatti, *Ph.D. (IIT/D)*	Electrical Energy Systems, Reactive Power Compensation, Power System Control and Optimization, Wind & Hydro Power Generation.
Avinash Chandra, *Ph.D.(Aligarh)*	Plasma Physics, MHD Power and Thermal Power Plants, Electrostatic Precipitators, Indoor & Outdoor Air Pollution Control.
R. P. Dahiya, *Ph.D. (Kurukshetra) (on lien)*	Plasma Technology and Industrial Applications, Instrumentation, Environmental Sciences & Engineering, Vacuum Technology, MHD Power Generation.
L. M. Das, *Ph.D. (IIT/D)*	Alternate Fuels, Hydrogen Energy, I.C. Engines.
M. G. Dastidar, *Ph.D. (IIT/D)*	Solid Fuel (Coal/Biomass) Conversion Processes (Pyrolysis, Gasification, Liquefication), Coal Bio Desulfurization, Industrial Waste and Effluent Treatment.
Viresh Dutta, *Ph.D. (IIT/D)*	Experimental Solid State Physics, Thin Film Physics, Photovoltaics.
A. Ganguli, *Ph.D. (I.I.Sc.)*	Plasma Physics, Plasma Sources.
Tara C. Kandpal, *Ph.D. (IIT/D)*	Solar Energy Utilization, Integrated Rural Energy Systems, Renewable Energy Education and Training, Economics and Energetics of Renewable Energy Technologies, Testing and Standardization of Renewable Energy Devices.
S. C. Mullick, *Ph.D.(IIT/M)*	Thermal Engineering, Solar Energy, Heat Transfer, Energy Conservation, Thermal Performance Testing & Evaluation.
D. K. Sharma, *Ph.D. (Delhi)*	Environmental Pollution, Fuel Technology, Biotechnology, Carbon-Materials, Polymers, Chemical Technology, Process Development.
R. P. Sharma, *Ph.D. (IIT/D)*	Laser Induced Fusion, MHD Power, Space Plasma and Plasma Physics.
G. N. Tiwari, *Ph.D. (B.H.U.)*	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, Plasma Physics.

Associate Professor

H. D. Pandey, *Ph.D. (IIT/D)*	Laser Induced Fusion and Plasma Physics.

Assistant Professors

K. A. Subramanyan, *Ph.D. (IIT/M)*	Internal Combustion Engines and Alternative Fuels (Biomass derived Fuels and New Generation Fuels), Simulation & Modelling of IC Engine Processes, Hybrid and HCCI Concept Engines, Fuel Economy and Emission Reduction.
R. Uma, *Ph.D. (IIT/D*)	Plasma Physics and Fusion.
Ramesh Narayan, *Ph.D. (JU*/Kolkata)	Plasma Physics and Fusion.

Principal Scientific Officer

A. K. Sharma, *Ph.D. (Agra)*	Plasma Physics and Fusion Energy, lonosphere Space Plasma, Laboratory, Plasma and Nonlinear Dynamics, Material Processing and Experimental Beam Plasma Instabilities, Laser Harmonic Generation, Experimental Soild State Physics, Thin Films and Vacuum Technology.

Senior Scientific Officers - I

S. N. Garg, *Ph.D. (Punjab Univ., Chandigarh)*	Solar Radiation, Measurement and Computation, Energy Conservation in Building, Energy Efficient Windows, Energy Savings in Lighting Systems.
Subodh Kumar, *Ph.D. (IIT/D)*	Solar Energy Utilization, Energy Conservation, Air Pollution Control.

IRD Fellow

K. Gadgil (Ms.), *Ph.D. (IIT/Kgp)*	Heterogeneous & Homogeneous Catalysis, Combustion of Solid Fuels, Bioconversion and Environmental Pollution.

Energy has a central role in our lives and manifests itself in many forms. Energy forms an integral part of all the scientific and engineering disciplines. Since the demand for energy world-over has been growing, energy specialists are needed who have a complete understanding of all the different aspects 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 of the country in particular and the world in general. Energy efficiency has already been prioritized by the Parliament through the Energy Conservation Bill. A separate bill on Non-Conventional Sources of Energy is also being prepared**.** 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. Courses in Energy and Environmental Management are also conducted to develop human resources to tackle the complex issues arising out of the environmental impacts.

Academic Programmes

(a) The Centre offers the following interdisciplinary post-graduate programmes, leading to the award of M.Tech degree and research programmes leading to Ph.D. degree:

  (i) M.Tech. in Energy Studies - Full time Morning programme for Engineering graduates and Science postgraduates.

  (ii) M.Tech. in Energy and Environment Management - Part time Evening programme. It is open to persons employed in public/private sector organizations, Research and Development Establishments.

  (iii) Ph.D. in Energy Studies in the research areas listed under the heading of Research and Development Activities.

(b) The Centre also offers several electives in the emerging areas of Energy and Environment for UG students on elective basis as open category courses.

(c) Further, the centre also conducts continuing education programmes of short duration in subjects like energy conservation, integrated energy systems, renewable energy, clean power generation, instrumentation, etc.

Research

The Centre interacts with the R&D activities in various departments and centres of the Institute. The major R&D areas are:

1. Energy Efficiency

Enegry conservation is one of the important steps towards solving some of our energy problems. Energy is essentially used in the form of heat, electricity and oil (for transport). The work in this area is therefore concentrated on the following topics:

- Internal Combustion Engines.
- Electrical Energy Systems.

- Energy Efficiency in Buildings.
- Energy Conservation and Management

1.1 Internal Combustion Engines

The Internal Combustion Engine laboratory possesses various facilities for basic engine testing and for analyzing the exhaust for measuring CO, HC and NOx emissions. Using alternative fuels like ethanol, methanol, vegetable oils, hydrogen and biogas, the group undertakes engine design modifications to achieve higher efficiencies and low CO, PM and NOx emissions. The IC engines group has been involved in various National mission projects like developing a fuel injection system for gas fueled engines, a four stroke engine for two wheelers and plasma based nitride coating on vulnerable engine parts like cylinder or pistons. The activities in the area of IC engines also cover computer aided design in agriculture, power generation and transportation sectors.

1.2 Electrical Energy Systems

Some of the problems which make operation of the inter-connected power systems difficult even at the regional level are the growing proportions of thermal power plants as compared to hydro. Poor power management has resulted in high transmission and distribution losses accompanied with low power factors. The activities in this group therefore concentrate on real time monitoring and control of power systems, power systems reliability and production costing analysis, energy conservation in power distribution and utilization systems, reactive power compensation etc. The group also works on devising, testing, field trials and subsequent industrialization of developed equipment.

1.3 Energy Efficiency in Buildings

One of the main purpose of buildings is to provide internal environment where one can have visual as well as thermal comfort. This is partly provided by an energy efficient building design and/or by providing energy efficient end use devices. By using sophisticated computer modelling, the building group in the Centre assists the architects to arrive at an optimum design to achieve better day lighting and minimize the air conditioning load. Additionally, the group can also undertake the design and fabrication of building automation systems to reduce operating costs of energy.

1.4 Energy Conservation and Management

Aided by portable instruments measuring thermal, electrical, combustion and other parameters, the Centre can undertake extensive energy audits to identify where and in what form the energy is being used in an organization, intensity of energy use and identification of energy conserving opportunities. The audit report presented to the organization contains detailed techno-economic evaluation of each of the energy conserving opportunities and priority wise recommendations for implementation. The technology improvement for achieving better energy efficiencies is worked out through constant R&D activities.

2. Fuel Technology

The biggest problem in effective utilization of Indian coals has all along been high mineral content. Coal liquefaction and gasification being capital intensive, the returns so far have come from washing the coal, where a trade off is made between the floats, middling and rejects. In this context, new initiatives have been taken at the IIT Delhi resulting in solubilisation of the major part of the coal substance by extraction at the atmospheric pressure with combinations of polar organic solvents which are recycled.This process has been termed as organo-refining of coals. The extract is almost zero ash and can be treated as organic feed stock for further processing.This reason has led to the development of clean coal Technology which may be useful for the coal based power generation and for steel plants. Bioleaching and biosollubilisations have been found suitable to dimineralise the coal. Other activities in the fuel technology include (i) Conversion of coal to liquid, (ii) Utilization of coal extracts for value added end uses such as a chemical feed stock, (iii) Conversion of the products of coal gasification to synthetic natural gas methane and to provide alternative energy transport systems, (iv) Coke making, (v) Coal Desulphurization Coal Cleaning. Other interests of the group include biodesulfurisation of petroleum, coprocessing of vacuum residue with plastics and coal, waste management etc.

Environmental Pollution

Quality of air, indoor as well as outdoor, is a major concern nowadays. Indoor quality is severely effected through release of radioactive as well as chemical emission from various building materials. One such source is the emission of radon into the indoor air due to high inflow from soil, building materials & natural gas. Similarly, chemical fumes deteriorate the indoor air quality leading to so called sick building syndrome. The efforts are made to provide indices for indoor air quality in a combination of climatic parameters and the emission.

Facilities are available to quantify the emission in the exhaust of an industry and IC engines in the transport sector and constant efforts are made to upgrade the technology to check emission from the exhaust. Performance evaluation and upgradation of Electrostatic Precipitators [ESP] in thermal power plants has been undertaken. Industrial Wastes & Effluent Treatments, Hospital Waste Management, Treatment of Coal Water Slurry generated from Coal Industries are also undertaken.

Renewable Energy Sources

Solar, Wind, Biomass, Water and other energy sources are cleaner and perennial energy sources which the nature has provided for the use of mankind. The Centre has done pioneering work in the areas of solar thermal technologies and solar photovoltaic systems. Design of solar hot water systems, driers, space heating/cooling systems is performed by using state of art computer softwares. Original contributions have been made in the area of Solar Cooker and Collector Testing. Similarly, solar photovoltaic systems and components are tested and complete design is provided for different load and different climatic conditions. Design and Fabrication of Thin Film Solar Cells is also conducted. Recently work has been initiated in integrated solar, wind, diesel systems. Test facility is being created for microhydro systems. Extensive data base is available on meteorological parameters, products and other items.

Plasma Science and Technology

The activities of this group cover both theoretical and experiment aspects of plasma physics. The theoretical group is engaged in working on waves, instabilities in the lonosphere Magnetosphere and laboratory (fusion) plasmas. However, at high power a variety of nonlinear phenomena occur. The group is therefore working on nonlinear dynamics of plasmas including self organization and chaos to study plasma behaviour at high power particularly in fusion phenomenon. Recently the plasma group oriented itself also towards industrial applications of plasma. A very special facility has been created in the Centre for plasma coatings on the surfaces to achieve the required hardness.

Facilities in the Centre

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

Software

Energy Simulation Laboratory

A collection of excellent software backed by a comprehensive data base. The software packages can be used for Energy Efficient Building Design, Solar Photovoltaic and Solar Thermal System Design, Hybrid System Design and Calculation of AC loads. Optimal Power System Expansion Model including the Environmental Impacts and Design and Analysis of Electrostatic Monitoring Precipitator.

Fuel Technology

- Gas Chromatograph : Gas Analyser.
- Muffle Furnace : Proximate Analysis of Fuels.
- Coke Reactivity Index.
- PH Meter.
- Ion Meter for Fluroide Measurement.
- Viscometer.
- UV- Visible Spectrophotometer.
- BOD Incubator with Rotary Shaker.
- Soxhlet Extractor.
- Bomb Calorimeter.
- Pyrolyser.
- Microbial activities related to coal, biomass and industrial effluents (Laminar Flow, Orbital Shaker).
- Fractionation of liquid Mixtures.
- Carbon Nitrogen Hydrogen Sulphur Analyser.

Environment Pollution

- Indoor Comfort Meter.
- Low Pressure Biogas Burner Testing Facility.
- Rodex Potentiometer.
- High Rate (upto 500 kW) Oil Burner, Combustion Chamber, Channel and Exhaust System.
- Evaluation of Biomass Fuel Stores for Thermal Efficiency and Air Pollution Emissions.
- Ash Resistivity Measurements Facility to Support ESP Programme in India.
- Atomic Absorption Spectro Photometer.

Electrical Energy Systems

- 11 KV Prototype Substation Model for Power Factor and Unbalance Voltage Testing.
- Real Time Monitoring of Micro Alternators.
- Vertical Axis Wind Turbine Power Generation.
- Micro-Hydro Power Generation.
- Long Transmission Line Models.

Renewable Energy

- Photovoltaic Module and System Test Facility Including PV Pump, Solar Lanterns & PV Inverters.
- Indoor/Outdoor Test Facility for Solar Distillation System.
- Thermal Conductivity Analyser.
- U Value Measurements.
- Alphatometer and Emissometer.
- Solar Transmittance Measurements.
- Solar Cooker Test Facility.
- Crop Drying Simulator.
- Thin Film Deposition Facility.
- 25 KWp Roof Top Photovoltaic Generator.
- Temperature Dependant I-V Characterization of Solar Cells using Flesh Solar Simulator.
- Spectral Response Measurement using Filter Wheel.
- Lock-in based C-V-W Measurement System.
- Excitonic Solar Cell Fabrication Facility.
- Solar Energy Park.

  In Solar Energy Park, the following facilities exits :

  i) PV Based Underground Water Lifting.
  ii) PV Based Control System for Green house.
  iii) PV Based Operation of Lighting/Fan and Computer in Mud House.
  iv) Solar Distillation.
  v) Solar Dryer Based Green House.
  vi) Solar Radiation Measurement.
  vii) Earth-Air Heat Exchanger for Heating and Cooling of Green house and Mud House.

I.C. Engines

- Analysis of Engine process using Computational Fluid Dynamic.
- Facility for Basic Engine Testing of Performance and Emission Characteristics.
- Dynamometer for Evaluating Engine Performance.
- Gas Analyser for Measuring CO, HC and NO_x Emissions. Cylinder Gas Pressure Measuring and Processing.
- Measurement of Injection and Combustion Characteristics of IC Engine.

- Unit. AVL Research Engine to vary all Engine Parameters.
- Measurement of Flame Characteristics using AVL VISEOFEM for use of alternative Fuels.
- Passenger Car Engine Test Bed.
- Fuel Engine Development for use of alternative Fuels.
- Characterization of Fuel Quality for alternative Fuels.

Plasma Laboratory

- Beam Plasma Laboratory.
- 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.
- Electron Cyclotron Resonance Plasma Production Systems.
- Helicm Wave Plasma Production Systems.
- Facility for Nonlinar Plasma Experiments.
- High Resolution Spectrometer (V-UV range) for Plasma.
- Spectroscopic System for (a) Measuring Flame Temperature up to 3000 K (b) Spectrum Analysis of Light.
- Sources in Visible Range.
- Microwave Generator at 2.45 GHz upto 5 kW Power.
- Plasma Kits for Air/Water Pollution Control.
- Software on Beam Propagation Methods and Self Organization/Chaos.
- Plasma Simulation Facilities.

Energy Audit & Conservation

Portable energy audit instruments like temperature, humidity, velocity meters, surface temperature reading instruments, clamp type voltmeter, ammeter and power factorometer.

Ph.D. Research Areas

Energy Efficiency, Fuel Technology, IC Engines, Electrical Energy Systems, Heat & Mass Transfer, Renewable Energy Systems, Solar PV and Thermal Systems, Environmental Pollution and Energy Planning, Plasma Physics and Plasma Sources, Industrial Application of Plasma, Energy Conservation in Building & HVAC Systems, Air & Water Pollution, Waste Management.

Industrial Tribology, Machine Dynamics and Maintenance Engineering Centre

Professor and Head

N. Tandon, *Ph.D. (IIT/D)*	Vibration and Acoustic Emission Monitoring, and Noise Engineering.

Professors

J. Bijwe, *Ph.D. (IIT/D)*	Tribology of Polymers / Composites, Nano-Composites and Oil Analysis for Condition Monitoring.
O.P. Gandhi, *Ph.D. (IIT/D)*	Diagnostic Maintenance, Reliability, Risk Analysis and Safety and Acoustic Emission.

Chief Design Engineers (SG)

V.K. Agarwal, *Ph.D. (IIT/D)*	Dilute and Dense Phase, Pneumatic Handling of Bulk Solids and Erosive Wear.

Assistant Professor

R.K. Pandey, *Ph.D. (IT/BHU)*	Bearing Design, EHD Lubrication, Computational Fluid Mechanics and Tribological Elements Design.

Design Engineer

R.K. Rai, *M.Tech. (IIT/D)*	Instrumentation and Non-destructive Testing.

Industrial Tribology, Machine Dynamics and Maintenance Engineering Centre (ITMMEC) is a premier Centre in the country, Initiated under Indo-Norwegian Technical Collaboration Programme. The Centre is actively interacting with industry in the field of Friction, Wear and Lubrication, Lubricants, Wear Control, Design of various Tribological Elements, Maintenance Engineering, Non-destructive Testing, Reliability, Availability and Maintainability (RAM) Engineering, Failure Analysis, Design Audit, Vibration and Noise Engineering, Condition Monitoring, Performance Evaluation, Filtration, Bend Erosion and Pneumatic Conveying.

The Centre has excellent facility for experimental, analytical and development research activities. With its highly specialised manpower, the Centre interacts with industries through consultancy, field service and also joint sponsored research programmes. The Centre has nine well-equipped laboratories, which are open to use jointly by representatives of industry and faculty & students of the Institute. A strong base and infrastructure has been established between ITMMEC and many industries; both in public and private sectors, through effective interaction. The Centre also runs short-term specialized courses for continuing education of practicing engineers form industry. These courses may have either open participation or specially oriented for a particular sector of industry.

Research

The Centre provides excellent facilities for industry-oriented research and development work. Research work for doctoral degree of the Institute is also undertaken. The current research activities of the Centre are:

1. **Tribology:** Tribology of polymer / polymer composites, ceramics and metals. Wear mechanisms and modelling of metallic and non-metallic materials and surface engineering. Modelling of boundary, hydrodynamic and elastohydrodynamic lubricated regimes, lubricant characterization and analysis, theory of conformal and non-conformal contacts viz. journal bearings, antifriction bearings, gears, cams and followers, etc., Dynamics of bearings, Pneumatic conveying of bulk solids, operational problems like erosive wear, and degradation and evaluation of systems.
2. **Maintenance Engineering and Machine Dynamics:** Condition based maintenance, signature analysis, vibration, acoustic emission, temperature and wear debris monitoring techniques, maintenance planning and control, computer aided maintenance, maintenance audit, reliability, availability and maintainability (RAM) engineering, vibration & noise analysis, risk analysis & safety, non- destructive testing, fracture and fatigue, residual life estimation, failure analysis, design audit, performance and dynamic study of machine elements and equipment like pumps, compressors, turbines, etc.

Instrument Design and Development Centre

Chief Design Engineer (S.G.) and Head

N.K. Jain, *Ph.D. (IIT/D)*	Power Electronics, Switch Mode Power Conversion, Electronics Instrumentation.

Professors

D.T. Shahani, *Ph.D. (IIT/D)*	Electronic Instrumentation, Electro-magnetics, Antennas.
Chandra Shekhar, *Ph.D. (IIT/M)*	Holography, Holographic Optical Elements, Fibre-optic Sensors, Optical Instrumentation Flame Tomography.
A.L. Vyas, *Ph.D. (IIT/D)*	Electronic Instrumentation, Virtual Instruments, Smart Sensors and Signal Processing.

Chief Design Engineers (S.G.)

A.K. Agarwala, *M.S. (USA)*	RF-Circuitry, Electronic Design, Instrument Design.
S.K. Atreya, *D.I.I.T. (IIT/B) R.A. (UK)*	Industrial Design, Graphic Design Computer Aided Design, Ergonomics Interior Design, Architecture, Instrument Enclosures, Education Technology, Software Development, HC Interaction Design.
Rakesh Kumar, *Ph.D. (Delhi)*	Photomechanical Engineering, Optical, Opto-electronic and Photo-mechanical Instrumentation, Experimental Strain Analysis FRP Composites.
I.P. Singh, *Ph.D. (IIT/D)*	Mechanical Design, Instrumentation, Microprocessor Applications, Mechanical Properties of Polymers & Composites and Energy Storage Systems, Solid Mechanics. Embedded System, Hybrid Polymer Nano-Composites.

Associate Professor

Dalip Singh Mehta, *Ph.D. (NPL Delhi/ CCS Univ., Meerut)*	Optical Coherence Tomography and 3D Surface Profilometry, Optical Tweezers and Applications, Laser Inferometry, Laser Doppler Velocimetry, Advanced Microscopy, Holography and Optical Coherence.

Assistant Professor

Amitoj Singh, *M.Des. (IIT/D)*	Industrial Design, Product Design, Design and Emotions, Automobile Styling Design, Strategic Design Management, User Centred Design, Frame Work of Design, Prototype.

Emeritus Fellow

R. Arockiasamy, *Ph.D. (London)*	Electrical Machines, Power Electronics, Microprocessor Based Instrumentation.

IRD Fellow

S.K. Sud, *M.E. with Hons. (Roorkee)*	Applied Electronics, Servo-mechanisms & Microprocessor Based Instrumentation.

Re-Employed as CDE (SG)

L.K. Das, *M.Tech. (IIT/D) MA. (RCA, London)*	Industrial Design, Product Design, Design Education, Computer Aided Design, Design Innovation.

The primary goals of Instrument Design Development Centre are to undertake research, development and training in the area of Instrument Technology. The Centre specialises in Electronic Instrumentation, Mechanical Instrumentation, Optics and Laser Techniques and Industrial Design. The Centre runs two postgraduate teaching programmes in Instrument Technology and Product Design. The Centre also undertakes sponsored R&D and consultancy projects from Government organizations and industries. Some of the current areas of R&D are Electronics Design, Electromagnetic Sensors, Smart Sensors and Sensor Signal Processing,Virtual and Programmable Instruments, TV Holography/Digital Laser Speckle Techniques for Monitoring Vibrations, High Frequency Inverters, Photo-Chemical and Electro-Photo-Chemical-Machining, Tele-Medicine, Machine Vision, Electrical Wheel Chair for the Physically Handicapped, Eco-friendly Hybrid Vehicles, Eco-design, Ergonomics, Solar Architecture, Mechanical Design, Experimental Strain Analysis.

Academic Programmes

The Centre offers research programmes leading to Ph.D. degree in the area of Instrument Technology and related subjects. The Centre runs two interdisciplinary programmes, namely, M.Tech. in Instrument Technology and M.Des. in Industrial Design. The Centre's faculty also teaches UG and PG courses in other Departments and Centres. Short-term training courses on the current topics of Instrument Technology and related topics of interest to the Industry are also organised from time to time. Teachers from other universities are also trained through these courses. The Centre's faculty also guides UG and PG projects in other Departments and Centres. The Centre also provides fabrication facilities to the Post Graduate students and R&D projects of the Institute.

Research

The Centre is actively carrying out research in the areas of Electronic Design, Switch Mode Power Control, Electromagnetic and Ultrasound Sensors, DSP and Microprocessors Applications, Biomedical Instruments & Telemedicine, Photo Fabrication Techniques, Lens Design, Laser Applications and Holography, Biomedical Optics, Optical Tweezers, Optical Metrology, Non-contact Electro-optic Systems, Measurements Involving High Resolution Moire, Solid Mechanics, Mechanical Properties of Polymers and Composites, Methodology of Design, Prototype Development, Passive Solar Architecture, Design of Products for Handicapped, Computer Aided Design in Electronics, High Frequency Motors and Product Ergonomics.

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 training in Instrument Technology Laboratory, (c) Photo-mechanical Engineering Laboratory, (d) Laser Application and Holographic Laboratory; (e) Optics Laboratory and Workshop, (f) Industrial Design Laboratory and Model-making Workshop, (g) Industrial Design Clinic for Product Development with Ergonomics and Computer Aided Simulation Facilities. The Centre also has a Mechanical Workshop to assist in research activities of the Centre, which also serves R&D and fabrications for M.Tech./B.Tech. projects of the Institute. It also has MAC laboratory for CAD and Multimedia.

Ph.D. Research Areas

Computer Aided Design and Simulation of Electronic Instrumentation Systems, DSP and Microprocessor Applications, Power Electronics, Electromagnetic and Ultrasound Sensor based Instrumentation,Virtual Instrumentation, Tele-Medicine, Biomedical Instrumentation, Laser Application & Holography, Measurement of temperature and temperature profile of gaseous flames, Digital speckle pattern interferometry for vibration measurement etc. Optical Coherence Tomography (OCT) and 3-D Profilometry, Optical Tweezers and Applications, Opto-Electronic Sensors, High Resolution Moire & Moire Photography, Photo & Electro-Photo Chemical Machining, Solid Mechanics, Experimental Strain Analysis, Mechanical Properties of Polymers and Composites, Design Methodology & Management, Computer Aided Product Design, Ergonomics, Graphic Design, Passive Solar Architecture and Designs for Handicapped. Embedded System, Hybrid Polymer Nano-Composites materials.

Instrument Technology

This is an interdisciplinary M.Tech. Programme of 4 semesters (24 months) duration open to candidates with B.Tech. or engineering degree in Electrical, Electronics, Mechanical, Instrumentation or with M.Sc. in Physics with valid GATE score. The programme is also open to candidates sponsored by Government Organizations and Public Sector companied on full time basis. The teaching faculty is drawn from Instrument Design Development Centre, Departments of Electrical Engineering, Mechanical Engineering and Physics. The course details are given in the publication "Courses of Study 2009-2010".

Centre for Polymer Science and Engineering

Professor and Head

S.N. Maiti, *Ph.D. (Calcutta)*	Polymer and Rubber Technology, Compounding, Particulate Filled Composites, Thermal and Mechanical Properties, Polymer Blends, Micro and Nano-Composites.

Professors

Veena Choudhary, *Ph.D. (IIT/D)*	Synthesis and Characterization of High Temperature Polymer, Degradation and Stabilization of Polymers, Flammability of Plastic Materials, Smart Micro/Nano-Hydrogels for Biomedical Application, Functional Polymers for Fuel Cell Application, Polymer Blends and Nano-Composites, Biodegradable Polymer.
A.K.Ghosh, *Ph.D. (SUNY, Buffalo U.S.A)*	Rheology and Processing of Polymers, Polymer Reaction Engineering, Polymer Blends and Alloys, Mixing and Compounding, Computer Aided Modelling, Polymeric Nano-Composites.

Emeritus Professor

A.K. Gupta, *Ph.D., D.Sc. (Strasbourg, France)*	Structure - Property Correlation of Polymeric Materials, Polymers Blends and Composites, Testing and Properties of Polymers Fibres.

Assistant Professors

Josemon Jacob, *Ph.D. (Iowa State Univ. U.S.A)*	Synthesis and Testing of Conjugated Polymers for Applications in LEDs. FETs and Solar Cells, Conducting Polymers, Olefin Polymerisation Catalysts, Functional Nano-Materials.
Bhabani Satapathy, *Ph.D. (IIT/D)*	Morphology and Phase Behaviour of Block Copolymers and Blends, Micromechanics, Fracture and Fatigue of Polymer Nano-Composites.

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.

The Centre is actively involved in research and development activities involving doctoral research and sponsored projects. The faculty of the Centre closely interacts in teaching and research programs with the departments of Chemical Engineering, Chemistry, Mechanical Engineering, Textile Technology, Centre for Industrial Tribology Machine Dynamics and Maintenance Engineering, Centre for Applied Research in Electronics and Centre for Biomedical Engineering. The Centre also interacts significantly with the industry in terms of consultancy projects and technology development.

Academic Programs

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. Course work includes topics in polymer chemistry, polymer physics, polymer technology, polymer processing, polymer engineering, rheology of polymers and polymer composites, polymer coatings, degradation and stability of polymer. CPSE also offers a programme on Polymer Science and Engineering under Minor Area Scheme, which is a package of 20 credits of courses offered for B.Tech. students of Chemical Engineering, Textile Technology, Civil Engineering, Mechanical Engineering and Manufacturing Engineering. Besides these, the faculty are also involved in teaching of courses on polymeric materials offered at undergraduate and postgraduate levels by other departments of the Institute.

Research

Research in 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, polymer processing, Nano-Hybrid polymer particles as drug carries, smart hydrogels, polymer product design and modelling and simulation in processing is being carried at the Centre. 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 two decades.

Laboratory Facilities

Laboratories of CPSE are well equipped with various sophisticated instruments in the area of Polymer Synthesis, Characterization, Testing, and Processing. The facilities include Optical Microscopes, FTIR Spectrophotometer, Zwick MTS, Differential Scanning Calorimeter, Thermogravimetric Analyzer, Weather-o-Meter, Melt Rheometer, Extruder, Compression Moulding Machine, Injection Moulding Machine, Polarising Microscope, Two Roll Mill, Thermoforming Machine, Tool Grinding and Scrap Grinding Machine, Pulveriser, Mettler Hot Stage, Brookfield Viscometer, Small Angle Light Scattering Set up with Laser Source, Instrumented Impact Tester (Falling Dart Type), Impedance Analyser, Lab scale Film Blowing Unit, Haake Rheocard, Charpy and Izod Impact tester, Melt Flow Indexer or Gel Permeation Chromatograph, Dynamic Mechanical Analyser, Mold Flow 3D Analysis.

Ph.D. Research Areas

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, Crystallization of Polymers in Blends/Composites, Reactive Polymer Processing; Modification of Polymers; Morphological Studies of Polymers; Modelling and Simulation in Processing; Computer Analysis of Mould Filling; 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.

Centre for Rural Development and Technology

Professor and Head

S. N. Naik, *Ph.D. (IIT/D)* — Oils, Fats and Waxes Technologies, Agro-forest based Industries, Extraction of Natural Products by using Green Solvents, Nutraceuticals and Comoceuticals and Bio-fuels.

Professors

Rajendra Prasad, *Ph.D. (IIT/D)* — Chemical Engineering, Gas Dispersions in Liquids, Efficient Cookstoves, Village Industries, Entrepreneurship Development, Technology for Artisans and Weaker Sections, Leather, Pottery, Carpets, Food Processing, Milk Processing.

Santosh, *Ph.D. (IIT/D)* — Radiochemistry, Rural Energy-Environment Systems, Solid Waste Recycling, Sustainable Agricultural System, Traditional Science and Technology, Botanical Pesticides, Pesticide Residues and Food Safety.

Emeritus Professors

V.P. Sharma, *Ph.D. (Allahabad)* — Preventive Vector Biology, Vector Control, Epidimeology of Vector-Borne Diseases, Water & Health, Community Participation.

Associate Professors

Satyawati Sharma, *Ph.D. (IIT/D)* — Wasteland Recovery, Biomass Production and Conservation, Bioinoculants and Biofertilizers, Mushroom Cultivation, Sericulture, Organic Waste Management, Tissue Culture, Bioremediation, Biopesticides.

Virender Kumar Vijay, *Ph.D. (IIT/D)* — Renewable Energy Sources Biogas Purification & use in Vehicles, Rural Energy Planning and Management, Rural Industries & Technologies, Entrepreneurship Development, Biogas, Biomass & Animal Energy Technologies, Energy and Environment, Waste Recycling, Alternative Fuels for IC Engines, Panchgavya Products.

P.Sudhakar, *Ph.D. (IIT/D)* — Building with Bamboo, Renewable Energy, Animal Power.

Assistant Professors

Anushree Malik, *Ph.D. (IIT/D)* — Environmental Microbiology, Bioremediation of Metals/Pesticides Residues, Industrial/ Domestic Waste Water Treatment Bioleaching, Microbial Interactions in Natural Consortia, Food Safety, Biopesticides, Antimicrobial Agents.

Vijayaraghavan M. Chariar, *Ph.D. (IIT/D)* — Traditional Knowledge Systems of India, Traditional Technologies Science and Technology Policy, e-Governance for Rural Development, Micro-Enterprises, Ecological Sanitation, Green Composites.

UGC Fellow

S. K. Jain, *Ph.D. (IIT/D)* — Waste Water Treatment, Environmental Engineering.

Joint Faculty

Prof. M.R.Ravi	Mechanical Engineering Department
Prof.P.M.V.Subbaroa	Mechanical Engineering Department
Prof.T.R.Sreekrishnan	Department of Biochemial Engineering Biotechnology

Associate Faculty

Prof. P.L.Dhar	Mechanical Engineering Department
Prof. Ravi Chottopadhyay	Textile Deparment
Prof. Saroj Mishra	Department of Biochemial Engineering Biotechnology
Prof. Sangeeta Kohli	Mechanical Engineering Department
Dr. Apurba Mishra	Textile Deparment
Dr. Supratic Gupta	Civil Engineering
Dr. Suresh Bhall	Civil Engineering

Basic Objectives of the Centre

Vision:

To reach benefits of scientific and technological advancements to the rural sector by giving technical back-up for sustainable rural development and evolve models of holistic development for the nation and world at large.

Mission:

- 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 of IIT Delhi.
- Generate a sustainable technology base by blending appropriately modern science and technology with traditional knowledge.
- Undertake appropriate teaching, research, information dissemination and outreach related activities and network with other technical institutions, voluntary agencies, government organizations, and village industries, for achieving rural industrialization and improve the quality of life in rural areas.

The Centre also has special focus on upgradation of local people's science and engineering innovation.

The Centre has ongoing research through sponsored and Ph.D. projects on major thrust areas, namely Rural Energy, Environment and Infrastructure, Rural Industrialisation, Sustainable Food System and Biomass Production, Conversion and Utilisation.

In order to sensitize and motivate students towards societal issues especially with focus on application of 'S&T' for rural sector, Centre offers open elective courses for U.G. and P.G. students. Also, Centre joins hands with NRCVEE in undertaking programmes for inculcating Human Values and Engg. ethics.

The Centre has specialized in technologies like leather technologies, food processing, milk processing, honey processing, rural pottery technologies, mushroom cultivation, sericulture, tissue culture, rural engineering sector, entrepreneurship development programmes, super critical fluid extraction technologies, rural energy systems like biogas, gasifiers, animal power mircohydrlpower, improved cookstoves, vermicomposting, wasteland development programmes using silvi pastoral practices and microbial techniques, forest products processing, water management systems, solid waste recycling, waste water treatment, waste water disposal system, pollution control techniques, local area planning, tribal and hill area development.

For technology transfer on the above and outreach, the Centre interacts with the voluntary agencies and also works through its field units in Haryana and UP. In some areas the faculty directly interact with target groups and give technical back up.

The Centre collects and compiles information on rural technology for dissemination. It arranges symposia, workshops and special lectures on appropriate topics related to Sustainable Development. A Rural Technology Demonstration-cum-Training Unit at Micromodel, IIT Delhi has been setup for interfacing with people. This unit is useful for training of trainers and incubating technologies.

Faculty members from different deptts/centres are contributing toRural Technology Active Programme(RTAG) in a major way. As a result of all these efforts Rural Industrialisation has been approved as one of the Thrust Areas of IIT Delhi. In collaboration with HUDCO the centre has undertaken a national programme on bamboo utilisation with two interconnected components i) National Resource Facility on Bamboo Technology and ii) Interdisciplinary Programme on 'Bamboo Products : Design and Development'.

Ph.D. Research Areas

Integrated Energy Systems: Renewable Energy Technologies and their application, Bio-fuels, Environmental Pollution and protection Environmental Microbiology, Bio remediation, Biomass Production, Utilisation and Coversion Systems, Bio fertilizers, Bio-inoculants, Natural Products including Medicinal plants and Botanical Pesticides, Panchagavya Products; Artisanal technologies and Rural Industries, Metal Work, Pottery, Bamboo and Wood Pulp and Paper, Leather, Dairy & Food Processing etc., Waste Management; Rural Water Supply and Sanitation; Wasteland Reclamation; Alternative Agriculture System; Pesticides residues and Food Safety; Holistic Development, Traditional Science and Technologies, Indigenous Technical Knowledge.

National Resource Centre for Value Education in Engineering

Professor and Head

M. R. Ravi, *Ph.D. (IISc./B)*	Mechanical Engineering

Joint Faculty

V. M. Chariar, *Ph.D. (IIT/D)*	Centre for Rural Development & Technology
P. L. Dhar, *Ph.D. (IIT/D)*	Mechanical Engineering
Sangeeta Kohli, *Ph.D. (IISc./B)*	Mechanical Engineering
Santosh Satya, *Ph.D. (IIT/D)*	Centre for Rural Development and Technology
Kiran Seth, *Ph.D. (Columbia)*	Mechanical Engineering

Associated Faculty

Sneh Anand, *Ph.D. (IIT/D)*	Centre for Biomedical Engineering
G. Bhuvaneshwari, *Ph.D. (IIT/M)*	Electrical Engineering
Harish Chaudhary, *PGDM (IIMB)*	Management Studies
A. K. Gupta, *Ph.D. (IIT/K)*	Chemical Engineering
S. K. Gupta, *Ph.D. (IIT/D)*	Computer Science & Engineering
Saroj Kaushik, *Ph.D. (IIT/D)*	Computer Science & Engineering
M. S. Kulkarni, *Ph.D. (IIT/B)*	Mechanical Engineering
P.V. Madhusudan Rao, *Ph.D. (IIT/K)*	Mechanical Engineering
Anushree Malik, *Ph.D. (IIT/D)*	Rural Development and Technology
Samrat Mukhopadhyay, *Ph.D. (IIT/D)*	Textile Technology
Rajesh Prasad, *Ph.D. (Cambridge)*	Applied Mechanics
Anjan Ray, *Ph.D. (IIT/K)*	Mechanical Engineering
S. K. Saha, *Ph.D. (IIT/D)*	Mechanical Engineering
P. K. Sen, *Ph.D. (IIT/D)*	Applied Mechanics
Kamlesh Singh, *Ph.D. (Univ. of Raj.)*	Humanities and Social Sciences
P. Sudhakar, *Ph.D. (IIT/D)*	Rural Development and Technology
P. M. V. Subbarao, *Ph.D. (IIT/K)*	Mechanical Engineering
Jayashree Santosh, *Ph.D. (IIT/D)*	Computer Services Centre
D. Sunder, *Ph.D. (Pondicherry)*	Biochemical Engineering and Biotechnology
P. Vasudevan, *Ph.D. (Madras)*	Rural Development and Technology
Manjeet Jassal, *Ph.D. (IIT/D)*	Textile Technology

Background

NRCVEE was established at IIT Delhi in 2001 with active involvement of the Ministry of Human Resource Development with the objectives of functioning as a National Resource Centre for inculcating Value-based education in engineering Institutes. NRCVEE was set up to fulfil the need to create an awareness in the technical community that skills and human values are essentially complementary.

The main objective of the centre is to identify, develop and disseminate techniques by which engineering students and practising engineers can be motivated to imbibe values and to appreciate their impact on technology development, professional ethics and human welfare.

Specific activities envisaged for NRCVEE include :

(i) Preparing Innovative Resource Material for Value Education in Engineering, such as Monographs, Books, Video, Films, Practical Training Modules etc.

(ii) To undertake Research in the area of *"Interaction of Science, Technology and Human Values"* and to promote an understanding of its implications.

(iii) To promote the appreciation of Professional Ethics among students and practising engineers through case studies.

(iv) Organising Workshops to train teachers of various technical institutions in this field.

(v) Liaison with various organisations engaged in similar activities.

(vi) Organising Symposia, Seminars, Short Term Courses on relevant topics to promote awareness on such issues among engineering Professionals.

(vii) To help the academic community at IIT Delhi and other such institutions to develop appropriate academic programs for sensitising students towards value education and professional ethics.

Need for Research in Values in Engineering

With specific reference to India, by and large the professional world continues to function as if values and ethics do not matter in the pursuit of growth and success although there have been some notable exceptions in the form of industry leaders which are known to give highest emphasis to values and ethics.

Globally however, one can now see the beginning of a new paradigm. Leading institutions at the global level which focussed purely on economics and efficiency while working on the cutting edge of technology, research and development, manufacturing and management have begun to enlarge their perspective to first include equity and then ecology and now ethics. Corporate Social Responsibility and Ecological Responsibility were first added to the economic bottomline as important yardsticks for sustained leadership. More recently, Values Charter and Ethical Principles are the latest elements which have been added by large corporations, business houses and governments all over the world as an essential element of responsible and sustainable organisations.

It is now becoming increasingly clear that to achieve sustained growth, to occupy a leadership position, to build trust in a brand, it is absolutely essential to focus on values and ethics within the entire organisational hierarchy. This also needs to be extended to dealings with competing organisations, with the end user and all in choosing eco-conscious technological options.

Academic Programme

VEL 700	Human Values and Technology
VEL 710	Traditional Knowledge and Values
VED 750	Minor Project

Centre Activities

Since its inception, the centre has undertaken a series of activities towards the realization of its goals. These include workshops, panel discussions and guest lectures on issues related to integration of human values and technological development. In its attempts to develop suitable resource material, the centre has also

been interacting with other technical institutions and various organisations involved in value education. Over the last two years, the faculty of the NRCVEE have designed and delivered a three-stage Value Orientation Programme for incoming undergraduate students of IIT Delhi with modules on Holistic Education, Values-Skills Complementarity, Achieving Goals in Academics and Career, Personality Development using Campus Life, Healthy Mind in a Healthy Body, Socially Responsibility of Engineers, Time Management and Understanding Success.

Broad Research Areas

- Excellence in Engineering
- Integration of Science, Technology and Human Values
- Philosophy of Values
- Professional Ethics
- Strategies for Value Inculcation
- Technology and Human Values
- Values and Traditional Knowledge
- Values for Sustainable Development
- Wisdom-based Impersonal Leadership

Bharti School of Telecommunication Technology and Management

Professor and Coordinator

Subrat Kar, *Ph.D. (IISc./Bangalore)*

Associated Faculty

Deptt. of Electrical Engineering

Ranjan Bose, *Ph.D. (Univ. of Pennsylvania)*

Devi Chadha, *Ph.D. (IIT/D)*

Vinod Chandra, *Ph.D. (IIT/D)*

Santanu Chaudhury, *Ph.D. (IIT/Kh)*

Swades De, *Ph.D. (SUNY-Buffalo)*

H. M. Gupta, *Ph.D. (IIT/K)*

V. K. Jain, *Ph.D. (IIT/D)*

S. D. Joshi, *Ph.D. (IIT/D)*

Brejesh Lal, *Ph.D. (IIT/D)*

Ranjan Mallik, *Ph.D. (Univ. of Southern Colifornia)*

Shankar Prakriya, *Ph.D. (Toronto)*

S. Prasad, *Ph.D. (IIT/D)*

Deptt. of Management Studies

Rajat K. Baisya, *Ph.D. (Jadavpur Univ.)*

D. K. Banwet, *Ph.D. (IIT/D)*

Vinaysheel Gautam, *Ph.D. (London)*

Kiran Momaya, *Ph.D. (Toronto)*

Ravi Shankar, *Ph.D. (IIT/D)*

S. S. Yadav, *Ph.D. (Paris)*

Deptt. of Computer Science & Engg.

M. Balakrishnan, *Ph.D. (IIT/D)*

S. Banerjee, *Ph.D. (IISc./Bangalore)*

B. N Jain, *Ph.D. (Stony Brook)*

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

Deptt. of Mathematics

S. Dharmaraja, *Ph.D. (IIT/M)*

The Bharti School of Telecommunication Technology and Management (BSTTM) functions jointly with the Departments of Electrical Engineering, Computer Sc. & Engineering, and Management Studies.

The Bharti School was set-up in the year 2000 through a grant from Bharti Enterprises with the following objectives:

- To be a center 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 a research environment so as to 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., 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.

At present, the School conducts the following Inter-disciplinary Masters and Ph.D. Programs:

- M.Tech. in Telecommunication Technology and Management (TTM) jointly with Departments of Electrical Engineering and Computer Science and Engineering;
- MS(R) in Telecommunication Technology jointly with Electrical Engineering/Computer Science and Engineering;
- MBA (with focus on Telecom Systems and Management) jointly with the Department of Management Studies;
- Ph.D. in Telecommunication Technology/ Management jointly with Electrical Engineering/ Computer Science and Engineering/ Management Studies.

The School fully equipped laboratories in the area of Telecom Software, Wireless Networks and Telecom Networks.

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.

Amar Nath and Shashi Khosla School of Information Technology

Professor and Coordinator

Huzur Saran, *Ph.D.(UC Berkeley)* — Algorithms, Department of Computer Science & Engineering.

School Faculty

Sorav Bansal, *Ph.D.(Stanford)* — Operating Systems, Compiles, Virtualization, Department of Computer Science & Engineering.

S. K. Gupta, *Ph.D.(IIT/D)* — Graph Theory, Department of Computer Science & Engineering.

Pankaj Jalote, *Ph.D. (University of Illinois)* — Software Engineering, Department of Compurter Science & Engineering.

Sanjiva Prasad, *Ph.D.(Stony Brook)* — Reliable Computing, Systems Biology, Department of Computer Science & Engineering.

Vinay Ribeiro, *Ph.D.(Rice)* — Computer Networks, Department of Computer Science & Engineering.

Aaditeshwar Seth, *Ph.D.(Waterloo)* — Computer Networks, Social Network Analysis, Information & Communicaton Technology for Deveolpment.

Adjunct Faculty

Sakti Srivastava, *MBBS, M.S.(AIIMS)* — Medical Applications of IT, School of IT.

Associated Faculty

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

M. Balakrishnan, *Ph.D.(IIT/D)* — CAD of VLSI, Computer Architecture, Department of Computer Science & Engineering.

S. Banerjee, *Ph.D.(IISc., Bangalore)* — Computational Vision, Real Time Systems, Department of Computer Science & Engineering.

Ranjan Bose, *Ph.D.(Pennsylvania)* — Wireless Communication, Information Theory, Error Control Coding, Department of Electrical Engineering.

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

S. Chaudhury, *Ph.D.(IIT/Kgh)* — Computer Vision, Multimedia Systems, Computational Intelligence Department of Electrical Engineering.

A. Chawla, *Ph.D.(IIT/K)* — CAD, CAE, Dynamics, Biomechanics, AI & Expert Systems for Design and Manufacturing, Department of Mechanical Engineering.

A.K. Gosain, *Ph.D.(IIT/D)* — Integrated Watershed Modelling, GIS Hydrological Modelling, Irrigation Management, Environmental Impact, Department of Civil Engineering.

M.P. Gupta, *Ph.D.(IIT/D)* — MIS, e-Governance, Department of Management Studies.

Bijendra N. Jain, *Ph.D.(Stony Brook)* — Computer Networks, Department of Computer Science & Engineering.

P.K. Kalra, *Ph.D. (EPFL, Switzerland)* — Computer Graphics, 3D Animation, Department of Computer Science & Engineering.

S.N. Maheshwari, *Ph.D.(Northwestern)* — Algorithms, Parallel Processing, Information Systems, Department of Computer Science & Engineering.

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

"Amar Nath and Shashi Khosla School of Information Technology" (or "the School" for short) has been established to facilitate inter-disciplinary, goal-oriented research, innovation and post-graduate education in information technology, with funds made available by IIT Delhi alumnus Vinod Khosla (B.Tech., EE 1976).

The School promotes research in any area of Information Technology including (but not limited to): Dependable Computing, Information Security, Information Storage and Retrieval, High Speed Networks, Web Based Computing, Multimedia Systems, e-Commerce, Human-Computer Interaction, Robotics and Intelligent Systems, Embedded Systems and Sensor Networks, Geographical Information Systems, Optical Information Processing, Nano-Technology Modelling, Bio-informatics, Medical Applications of Computing.

At present, 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, including B.Tech. in engineering, or MBBS, or M.Sc. in Physical Sciences, or MCA.

It has state-of-the art laboratories for use by all students and faculty working in related areas. Currently 19 faculties from other departments in IIT contribute to research and educational programmes of the School. The school will soon have additional core faculty, supporting staff. The school is also expected have a fully-air-conditioned building, complete with seminar room, library, and laboratories.

The school enjoys autonomy similar to that available to other academic departments and centres. It has a designated Head who has the same functional autonomy and administrative, technical and financial powers available to heads of other academic departments and centres.

The school is guided by a School Advisory Board, but is administered by a specially constituted School Executive Committee. Academic activities of the School are looked after by its School Academic Committee.

School of IT is not restricted to any particular department or field of research. Research ideas from different areas are encouraged. At present there are three labs under school of IT.

1. **Advanced Information System Security Lab:**

   The lab aims to improve the state of computer security by providing research and education in all aspects of system and network security. This project is funded by National Technical Research Organization(NTRO).

2. **e-Governance Innovation Lab:**

   The lab is a joint activity between NISG and IITD. The area of research will be e- governance with different aspects. There will be separate research projects under this lab.

3. **School of Informatio Technology Lab:**

   This is a general computing lab for research in the area of High Speed Networks, Sensor Networks, Web Based Computing, and Bioinformatics.

School of Biological Sciences

Professor and Coordinator

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

School Faculty

Manidipa Banerjee,*Ph.D. (UCSD)*	Hepatitis A Virus Entry, Using Viruses as Nanoparticles. .
Archana Chugh, *Ph.D. (Delhi University.)*	Cell Penetrating Peptides, Marine Bioprospecting, Plant based Therapeutics.
Chinmoy S.Dey, *Ph.D. (Jadavpur University.)*	Insulin Resistant(Type 2) Diabetes and Drug Resistance in Leishmania: Molecular Mehanisms, Signal Transduction, target identification.
Aditya Mittal, *Ph.D. (Drexel Univ.)*	Cell Biophysics.
Bishwajit Kundu, *Ph.D. (IMTECH, Chandigarh)*	Protein Misfolding and Aggregation.
James Gomes, *Ph.D. (Tulane Univ.)*	Systems Biology, Metabolomics.
Tapan K. Chaudhuri, *Ph.D.(Bose Instt., Kolkata)*	Chaperone Assisted Protein Folding and Engineering.
Vivekanandan Perumal, *Ph.D. (CMC, Vellore)*	Hepatitis B Virus, Hepatocellular Carcinoma.

Modern Biology has departed from emphasis on individual or species level understanding to appreciating unity and 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 phenomena 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.

Faculty

The School currently has 8 core faculty members and a Coordinator (all Ph.D. from leading institutions). This number is expected to grow in the coming years.

Background and History

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 (28-06-2007). 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 expressed by some 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. These faculty members have since joined (27/12/08) the School and a coordinator was appointed for the School to initiate the academic activities in the new School of Biological Sciences. Subsequent to this, the physical space for the School (formerly known as IBM building) has been allocated on the campus.

The NAC suggested following theme research areas that could be pursued in the School of Biological Sciences at IIT Delhi: (a) Infectious diseases and Non-communicable disorders, (b) Cognitive and computational neurosciences, and (c) Engineering Biomaterials.

The five 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 elaborated the vision and mission statements 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 teaching.

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 has a Ph. D. programme. The key strength of the research programme at the School is its multi- and inter-disciplinary approach towards biological sciences. 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. Sample questions for the written test will be posted on the School website in due course of time.

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.

All the courses of the Ph. D. programme will be offered as open electives (as per IIT Delhi rules for "700-level") to the undergraduate and postgraduate students from all streams at IIT Delhi.

List of courses offered by the School (as approved by the IIT-D senate in June 2009)

SBC795 Graduate Student Research Seminar (0-1-0)
SBL701 Biometry (3-0-0)
SBL702 Systems Biology (3-0-0)
SBL703 Advanced Cell Biology (3-0-0)
SBS800 Independent Study (0-3-0)
SBV881 Advances in Chemical Biology (1-0-0)
SBV882 Biological Membranes (1-0-0)
SBV883 Chaperone and Protein Conformational Disorders (1-0-0)
SBV884 Elements of Neuroscience (1-0-0)
SBV885 Protein Aggregation and Diseases (1-0-0)
SBV886 Signaling Pathway Analysis (1-0-0)
SBV887 Current Topics in Computational Biology (1-0-0)
SBV888 Current Trends in Computer Aided Drug Discovery (1-0-0)

9. INTERDISCIPLINARY M.TECH./M.DES. PROGRAMMES

Besides a number of regular courses that are offered at the postgraduate level by the academic departments/ centres, the Institute offers six 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.

9.1 INTERDISCIPLINARY M.TECH. PROGRAMMES

The Interdisciplinary M.Tech. programmes are the following specializations:

- Computer Applications.
- Energy Studies.
- Industrial Tribology and Maintenance Engineering.
- Instrument Technology.
- Opto-Electronics and Optical Communication.
- Polymer Science and Technology.
- VLSI Design Tools and Technology M.Des. Programme in Industrial Design.
- Telecommunication Technology for Management.

9.2 SPECIAL PART-TIME M.TECH.(EVENING) PROGRAMME

- Energy of Environmental Management.

9.3 POSTGRADUATE DIPLOMA IN METRO RAIL TRANSPORT: TECHNOLOGY AND MANAGEMENT

Course details are given in Courses of Study 2010-2011.

Computer Applications

The 2 year Inter disciplinary M.Tech Programme in Computer Applications aims at imparting techniques and applications in the area of computer applications. The participating departments are Mathematics, Computer Science and Engineering, Electrical Engineering, Mechanical, Civil, Applied Mechanics and Centre for atmospheric Sciences. For these students, a number of courses are offered by the Department of Mathematics and courses are offereed by the Department of Computer Science & Engineering and Department of Electrical Engineering. Apart form these courses the students also take appropriate elective courses from other departments within the Institute.

Energy Studies

This centre provides two M.Tech. Programmes- full time (2 Years) in the Morning session and part time (3 years) in the Evening session. The full time M.Tech (Energy Studies) is designed to cover various facets of the energy problems and the possible alternatives. Admission to this interdisciplinary programme is made through GATE.

Another M.Tech. programme in Energy and Environmental Management is offered on part time basis in the evening.The programme is for six semesters catering to the need of working professionals, sponsored by their organisations. Besides core courses and common electives, the programme concentrates on four modules viz. Industrial Energy and Environmental Analysis, Power Management, Energy Policy and Environmental Regulations and Management of Renewable Energy Sources.

Depending on the interest and aptitude, a student can undertake project work in any one of the seven major areas of project work, viz. Energy Efficiency in IC Engines, Electrical Systems and Buildings, Fuel Technology and Environment Pollution, Renewable Energy, Energy & Exergy Analysis, Energy Conservation & Planning and Plasma Science & Technology. The students, on completion of the programme, are equipped to undertake research/development and planning activity in the various scientific laboratories under CSIR, Defence and other R&D organisations, utility undertakings, government agencies, industries and universities.

Industrial Tribology and Maintenance Engineering

Interdisciplinary M.Tech. programme in Industrial Tribology and Maintenance Engineering is of four semesters (24 months) and is open for admission to candidates with Bachelor of Technology or engineering degree in Mechanical / Mining / Agriculture / Automobile / Marine / Industrial Engineering / Manufacturing Science & Engineering / Production Engineering. Candidates seeking admission with assistantship or self-financing in this programme must possess valid GATE score. This programme also admits candidates sponsored by industries on full-time or pat-time basis. The teaching faculty is drawn from various departments / centers: Industrial Tribology, Machine Dynamics and Maintenance Engineering Centre (ITMMEC), Departments of Applied Mechanics and Mechanical Engineering, and Centre of Polymer Science and Engineering (CPSE). Interdisciplinary programme is industry oriented and it offers curriculum and training, which are of relevance to the job requirement of engineers in industry.

Instrument Technology

This is an interdisciplinary M.Tech. Programme of 4 semesters (24 months) duration open to candidates with B.Tech. or engineering degree in Electrical, Electronics, Mechanical, Instrumentation or with M.Sc. in Physics with valid GATE score. 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, Departments of Electrical Engineering, Mechanical Engineering and Physics.

Optoelectronics and Optical Communication

,This 4-semester interdisciplinary M.Tech. Programme jointly run by the Electrical Engineering Department and Physics Department aims at providing advanced training in the interdisciplinary areas of Optoelectronics and Optical communication and to generate trained professionals in these areas with a strong background in both engineering and science. The programme covers fields like fiber optics, laser, semiconductor Optoelectronics, optical electronics, optoelectronic instrumentation, signal theory, digital communications, optical communication techniques and systems, broadband communication and information systems, photonic switching and networking. Under programme electives, the students can cover new areas of most contemporary development such as guided wave optical components and devices for dense WDM applications, integrated optics etc. The students also have a wide choice of open electives to choose from. These include data structures, computer network, digital signal processing etc. The admission to this interdsciplinary programme is made through GATE. All students are required to register for a minimum of 60 credits without counting courses for which "W" grades or "N" grades are awarded.

Polymer Science and Technology

This is an interdisciplinary M.Tech. Programme of 4 semester (24 months) duration open to candidates with B.Tech. in Polymer Engineering, Plastics and Rubber Technology, Chemical Engineering, Textile Technology, Mechanical Engineering and M.Sc. in Chemistry and Physics, with valid GATE score. This programme is also open to candidates sponsored by industries on full-time or part-time basis. The curriculum includes Polymer Chemistry, Polymer Physics, Polymer Characterization, Polymer Rheology, Polymer Testing and Properties, Polymer Technology, Polymer Processing, Polymer Blends and Alloys,Polymeric Coatings, Polymer Nanomaterials and Nano Composites and Product Design, etc. The teaching faculty is drawn from various Departments and Centres including Centre for Polymer Science & Engineering, Centre for Biomedical Engineering, Mechanical Engineering and Textile Technology.

VLSI Design Tools and Technology

VDTT Programme is an industry sponsored interdisciplinary M.Tech. programme run with faculty drawn from Electrical Engineering Department, Computer Science & Engineering Department and Centre for Applied Research in Electronics. The VLSI Design, Tools and Technology is a unique industry sponsored interdisciplinary M.Tech. Programme offered by IIT Delhi. The programme caters to full time sponsored students as well as industry sponsored students. The courses cover all the three major areas of VLSI, namely Design of VLSI Circuits, Development of Computer Aided Design Tools and VLSI Technology and Microelectronics.

The current list of sponsoring organizations is as follows:

1. NXP Semiconductors.
2. Cypress Semiconductors.
3. Nokia Research, Germany.

4. Intel Corporation.
5. Cadence Design Centre.
6. National Semiconductors.
7. Synplicity.
8. Transwitch.
9. IBM.
10. Emerging Memory Technology.
11. Calypto Design System.
12. Tanmic Systems.
13. SiRF.

The Programme is offered jointly by three Departments/Centres of the Institute, namely:

1. Electrical Engineering Department.
2. Computer Science and Engineering Department.
3. Center for Applied Research in Electronics.

Admissions are based on:

1. A qualifying GATE score.
2. An interview by the Selection Committee of the VDTT programme.
3. An interview by the Sponsor.

Association of a Sponsor to a candidate is based on a match between:

1. Candidate's choice.
2. Preference indicated by Sponsor on basis of his/her interview.
3. Results of his/her interview by the Selection Committee of the VDTT programme.

The Programme is normally for a period of 24 months. During the Programme, the students enjoy an assistantship for Rs. 8000/- a month; in addition to a contingency of Rs. 10,000/- per year to cater to their academic needs. During the first year, the student does Course and Laboratory work inclusive of a Practical Training in Technology at CEERI, Pilani. In the last 12 months of the Programme, the student does a Major Project under the joint supervision of a faculty member of IIT and a Researcher from the Sponsor. The second part of the project (last semester) is normally carried out at the sponsor's site.

9.4 MASTER OF DESIGN PROGRAMME

The Master of Design in Industrial Design is a two-year programme that caters to the requirement of industry for designers capable of creating high quality design of products for competitive markets. It is open to graduates in Engineering and Architecture. Candidates for full-time M.Des. with Institute fellowship or assistantship or self financed must have a valid CEED score as well. Full-time sponsored candidates are, also expected to clear CEED test as a demonstration of their apptitude for industrial design. The focus of the programme is upon the art and science of industrial design for creating innovative product concepts. The curriculum includes aesthetics, ergonomics, communication skills, materials, product design and manufacture, CAD, concurrent engineering, behavioural science and professional practice. The programme involves extensive project/studio work.

10. INTERDISCIPLINARY RESEARCH PROGRAMMES

In order to encourage research in interdisciplinary areas and to promote interaction between faculty in various departments and centres, the following Interdisciplinary Research Programmes are currently being run at the Institute.

- Opto-Electronics & Optical Communication Programme.
- Transport Research and Injury Prevention Programme (TRIPP).

10.1 OPTO-ELECTRONICS AND OPTICAL COMMUNICATION RESEARCH PROGRAMME

Professor and Co-ordinator, Subrat Kar, *Ph.D.(IISc. Bangalore).*

Since 1971 extensive research has been undertaken at the Institute by the faculty and associated research staff in the field of Fibre Optics and Optical Communication. In view of the extreme importance of this field as envisaged in early 1980s, R&D activities in the above area were formally launched under this programme covering several important aspects of Fibre Optics and Optical Communication. Main participating departments/centres are Physics, Electrical Engineering, IDDC and CARE. In particular, extensive R&D has been performed in the following broad 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. Most recent research involved state of the art topics like 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. Research in the above areas has resulted in a large number of publications in international journals. The development work carried out has led to commercialisation of a fibre optic educational kit and an erbium doped fiber amplifier. In addition, industrial consultancy work on a fibre optic current sensor and development of fused fibre coupler and components, high speed fiber optic communication systems etc. were also undertaken. 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. Several projects under Photonics Technology Development Mission have been funded by MHRD in collaboration with industrial partners and have been successfully completed.

10.2 TRANSPORTATION RESEARCH AND INJURY PREVENTION PROGRAMME (TRIPP)

Professor and Coordinator, Dinesh Mohan, *Ph.D. (Michigan).*

The Transportation Research and Injury Prevention Programme (TRIPP) at the Indian Institute of Technology (Delhi) 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. Faculty members are involved in planning safer urban and inter-city transportation systems, and developing designs for vehicles, safety equipment and infrastructure for the future. Activities include applied research projects, special courses and workshops, and supervision of student projects at post graduate and undergraduate levels. Projects are done in collaboration with associated departments and centres at IIT Delhi, government departments, industry and international agencies.

The Programme is recognised as a WHO Collaborating Centre for Research and Training in Safety Technology and as a Centre of Excellence for research on future urban transport by the Volvo Research Foundations.

The identified focus areas of the Programme are:

- Transportation planning and traffic flow analysis for optimising mobility and minimising accidents and pollution.
- Vehicle crash modelling, road safety studies, human body modelling 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.

Recent research projects include:

- Sustainable Urban Transport in Less Motorised Countries: Research and Training.
- Technical Support for the Implementation of High Capacity Bus System in Delhi.
- Road User Behaviour at Intersections in Delhi.
- Development of Methodology for Modelling of Airbags.
- Scientific Investigation of Road Accidents in Delhi.
- Review of Transport, Environment and Health Issues and Policies in Mega-Cities.
- Human Tissue Properties and Human Body FE Model.
- Development of a Road Safety Manual.
- Airport Traffic Circulation Improvement in Northern Region.

TRIPP organises short-term courses and workshops on road safety and transport issues regularly every year.

Postgraduate Studies in TRIPP:

Faculty members associated with TRIPP guide M.Tech. and Ph.D. students on interdisciplinary research topics in the focus areas identified above. Special facilities for research are available including research associateships in ongoing sponsored projects. Candidates may enroll on a full time or part time basis through appropriate departments and centres depending on the basic nature of the research contemplated.

Departments and Centres associated with TRIPP:

Applied Mechanics, Biomedical Engineering, Civil Engineering, Computer Science and Engineering, Mechanical Engineering, Humanities and Social Sciences, Mathematics.

11. MAJOR CENTRAL FACILITIES

11.1 COMPUTER SERVICES CENTRE

The main objectives of the Computer Services Centre are to:-

- provide round the clock computing and networking facilities.
- provide advice to all members of IIT on all aspects of academic computing.
- implement and maintain system and application software.
- impart introductory and advanced instructions to users.
- generate trained manpower in the IT area.
- interaction with industry.
- provide advice, implement and manage the Institute Network.
- provide support to Institute computerization efforts.
- do in - house research and development.
- serve a user population of more than 5000 users consisting of undergraduate and postgraduate students, research scholars, faculty and staff of the Institute.

In addition, the centre also participates in the academic programmes of various departments, undertakes Sponsored Research and Consultancy Projects and Conducts CEP Courses in several topical areas of Information Technology.

General Computing Facilities

The Centre is equipped with 18+1 node dual CPU Sun Linux cluster, Sun fire 6800, SUN Ultra Enterprise 3000 & 4000 Unix Compute Servers, CAD Graphics facility, Database Computing System, Nine rack mounted HP ProLiant Server Blades, Distance Learning facility and about 250 desktops connected over a switched fast Ethernet. The CSC also has 4TB SAN Storage & 22 TB NAS storage. Uninterrupted Power Supply is provided through 3x 80 KVA MGE UPS system and DG set.

PARALLEL/GRID COMPUTING (LINUX CLUSTER)

The Linux cluster is connected to 45 institutions in 12 cities over 100 Mbps National Garuda grid.

Hardware (Garuda Cluster)

- One Master/Frontend node
- SUN Fire x4200, 2x2.6Ghz, 4GB RAM , 4x73GB SAS
- 18 Slave/Compute nodes
- SUN Fire x4100, 2x2.6Ghz, 2GB RAM, 1x73GB SAS
- 24port 3COM Gigabit switch
- Avocent KVM switch (16 port), 36U Rack
- 22 TB NAS (SATA + FC).

Software

- OS-Linux x86-64
- CMS-Rocks
- Security- Area51 (firewall, tripwire, chkrootkit)
- Bioinformatics utilities – (HMMER, NCBI BLAST, MpiBLAST, BIOPYT, ON, CLUSTALW, MrBAYES, T-COFFEE, EMBOSS, PHYLIP, FASTA, GLIMMER)
- Condor- High throughput computing tools
- Ganglia – Cluster monitoring system from UCB
- Grid – Globus 4.0.2 (GT4)
- Java – Sun Java SDK and JVM
- PBS – Portable Batch System
- Pvfs2 – Parallel Virtual File System 2
- SGE – Sun Grid Engine job queuing system.

Sunfire 6800 High Performance System

The two domains of the 24 processor Sunfire 6800 support computation intensive and high-end research projects with high performance computing tools and state-of-art engineering software packages. It is a multi domain system. Presently two domains are configured as sunfire and sunfire with 16 and 8 processors respectively. E-220R, a backup server was gifted to the Institute by Sun Microsystems.

Hardware Configuration:

- 24 Processors x Ultra Sparc III, 900 MHz each with 8MB cache.
- 24GB RAM, 72 GB Internal SCSI disc.
- 4 x Fast Ethernet NIC Gigabit Ethernet NIC.
- 655 GB Sun Storage Fibre Channel storage 2 x T3 arrays RAID Storage.
- Enterprise 220-R backup system with Solstice Backup, Robotics License.
- 9 slot LTO Tape Drive Autoloader.
- 4 TB NAS.

Softwares:

- SUN HPC Cluster tools 4.0, Sun Grid Engine.
- Forte developer for HPC V6 with C++, Fortran compilers.
- Visual tool Sun Workshop, Solaris Resource Manager 1.2.
- MPICH V 1.2.4 Parallel Processing Software.

Advanced Engineering and Scientific Software Packages:

- MATLAB Version 7.4
- MATHEMATICA V4.1 (unlimited users server license).
- ANSYS Release 9.0
- ABAQUS 6.3.1.
- CANDENCE VLSI Design Tools.
- Connectivity via Citrix ICA Client, Meta frame 1.1/1.8 (100 licenses).
- Silvaco Software for Circuit Design.
- Lindo Software for Optimization.

SUN Ultra Enterprise Server 3000

SUN Ultra Enterprise server 3000 is a Unix server equipped with four 250 MHz Ultra Sparc CPUs each with 4 MB cache. It consists of 768 MB main memory, two 2.1/4.2 GB internal disks, a 17" colour monitor and 100 GB external RAID disk storage.

SUN Ultra Enterprise Server 4000

SUN Ultra Enterprise Server 4000 is also a Unix server having eight 250 MHz Ultra Sparc-2 CPUs each with 4MB cache. It has 5x256 MB main memory, two internal 2.1/4.2 GB disks and 17" colour monitor, two 1/4.2 GB internal disks, a 17" colour monitor and 100 GB external RAID disk storage.

Softwares

- Sun Workshop development environment including Pascal, C, C++, Fortran-77, Fortran-90.
- Visual computing tool Sun Workshop, SML interpreter, and public domain utilities.

CAD Graphics Facility

The CAD facility consists of ten Dell Workstations and a Dell Server.

Hardware Configuration of Dell Workstations (no. 10)

- Intel Xeon 5160 3.0 GHz Dual Core
- 5000X chipset
- 2GB RAM

- 256 PCIx16 NVIDIA Quadrofx-3450 video card
- 250 GB SATA HDD (7.2 K RPM)
- 19" TFT monitor
- Gigabit Ethernet controller
- 16x DVD Writer
- Windows Vista (32 bit)
- Dell keyboard
- Optical mouse.

Hardware Configuration of Dell Server

- Intel Xeon Dual Core (64 bit) 7120M 3.0 GHz
- 4MB L3 cache
- 2x300 GB SCSI HDD
- CDRW/DVD Combo drive 24x max
- 15" LCD monitor
- Gigabit Ethernet controller
- Redundant Power Supply
- SUSE Linux Enterprise Server 10 EM64T 32 CPU
- USB 104 keys keyboard
- USB mouse

FEA / CAD / CAE Software

- Ansys
- Abaqus
- Silvaco Atlas
- Lindo
- Fluent
- Cadence
- SNNS Neural Network software

HP PROLIANT SERVER BLADES

There are nine HP ProLiant Server Blades catering to different services:-

Database Services (No. 2)

- 2 –Dual core 2000 Series AMD 2.4 GHz
- 584 GB HDD
- 8 GB RAM
- Red Hat Linux
- Oracle 10g Enterprise

Antivirus/ Microsoft Deployment / DHCP Server (No. 7)

- Dual core Intel 5100 Series Xeon 2.33GHz
- 1333 MHz FSB
- 4GB RAM
- 292 GB HDD
- Windows Advanced Server 2000 Rel. 2
- Trend Micro System

Engineering and Technical Computing Software Network Licenses

The following software are available with Network licenses for installation & use on departmental systems & hostel PCs:-

MATLAB Technical Computing Environment provides core and advanced mathematical and graphical tools for analysis, visualization, and algorithm and application development. Matlab Release 2006b is available with the toolkits and number of licenses as listed below:-

Software	Licenses	Software	Licenses
MATLAB	100	Fuzzy Logic Toolbox	11
SIMULINK	50	Image Processing Toolbox	16
Curve Fitting Toolbox	5	Neural Network Toolbox	16
Communication Toolbox	11	Optimization Toolbox	10
MATLAB Compiler	10	PDE Toolbox	06
Control System Toolbox	10	Power System Blocks	10
Data Acquisition Toolbox	05	Signal Processing Toolbox	15
Signal Processing Blockset	10	Symbolic Math Toolbox	11
Extended Symbolic Toolbox	06	Statistical Toolbox	05
Wavelet Toolbox	10	Genetics Algorithm Toolbox	05
Bioinformatics Toolbox	05	Sim Power Systems	10
Simulink Control Design	10		

MSC NASTRAN V6 (65,000 nodes, 2 licenses), PATRAN V6 (6 licenses) modules non-linear, Dynamics, Thermal, Optimization, Super-elements, IGES Access, ANSYS Release 9.0 10 number of licenses for University Research for 512,000 nodes with modules: Structural, Coupled-Field, Electromagnetics, Fluids/CFD, Head Transfer, LS-Dyna, and Mathematica.

Database Services

The Centre has a Client/ Server Database Computing System- Oracle 10g Application & database Server at the back-end installed on HP ProLiant Server Blade under Linux (Red Hat) and at the front end, IDS developer suite software on Windows XP/Vista.

PC Services

There are five PC Labs in the Centre having around 250 Pentium IV (3.0 / 3.4) PCs' under the Windows XP/ Vista/ Linux environment. Out of these, two Labs are run with user authentication from SUN systems during log-in. Multimedia projection facility is also provided in three PC Labs for taking practical classes.

Softwares :

- MS Office 2007
- Visual Studio 2008
- Citrix ICA Clients (Matlab, Mathematica)
- Acrobat Professional 8.0
- Java SDK 2.0
- Trend Micro Office Scan Clients 8.0 etc.

Network Services

The Institute LAN is a state of the art switched network with Fibre Optics and enhanced CAT5/CAT6 UTP backbone. It consists of more than 6500 network access points spread using 158 Cisco switches, 6 routers and 65 virtual LANs. The 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, 4x2Mbps leased circuits from VSNL and 1x2 Mbps circuit from ERNET Internet bandwidth is further being expanded to 34 mbps circuit from Reliance. Internet and Intranet access is provided from faculty/officer homes using 56 dialup modems, and ADSL connectivity over internal telephone lines. An independent network has been provided for the administrative functions through Administrative Computer Support Services. Many network services including mail, web, domain name, anti-virus are being provided over this network.

Distance Learning Facility

A Pilot distance learning facility is established to support synchronous and asynchronous networked learning, virtual classrooms and courseware creation, with the following systems :-

- Course server for Web based courseware 2xSun-E220 R each with dual processor.
- 1 GB RAM, 36 GB disc, and Intra-learn Learning Management System.
- Computer laboratories for access to courseware with 45 Sun thin clients Sun Ray 100 with smart card readers.
- Cyber classroom with live web casting and video capture based on Real Server 8.0, Real Producer 8.1 and Cisco IP-TV.
- Media and content creation stations with Macromedia Author ware 6.0, Web Design studio 4.0.

11.2 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 (IRD) 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 R&D 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, 2009 to March 31, 2010, **116** new sponsored research projects with a funding of **Rs. 56.80 crores** were undertaken. In addition, **556** consultancy jobs worth **Rs. 18.54 crores** were also undertaken.

The Institute is actively involved in collaborative programmes with national and international organization/ universities to remain at the forefront of scientific and technological developments and to share knowledge. A large number of collaborative Research Projects are under operation with Institutes/Organizations of US, Canada, UK, France, Belgium, Germany, Holland, Italy, Switzerland, Hungary, Russia, Brazil, Japan, Korea, Australia etc. Major research activities have also been undertaken in the areas of national importance. Some of the International Sponsored Research Projects undertaken during the period year 2009-2010 are:

- Scaffold-based Control of Chondrocyte Phenotype: Towards Engineering of Intervertebral Disk Tissue.
- Optimal Mobility and Resource Management in Next Generation 4G Wireless Networks.
- Relationship between Water-Like Anomalies, Excess Entropy, and Potential-Energy Landscape in Core-Softened fluids.
- Software Agents for SIP-based Presence and Location Aware Mobility Services.
- EPFL -IITD Collaboration in Microengineering.
- Signal Processing and Information Theoretic Study of Cognitive Radio Networks.
- India-UK Consortium Partners for Centre of Excellence in Next Generation Networks Systems and Services.
- Hydrogen Generation by Electrolyses of Water.
- IDRC Research Chair in Wireless Communications.
- Development of a Non-hydrostatic Finite-volume Icosahedral Model for Regional/Global Climate Simulation and Weather Forecast.
- Bio-energy: Technology and Business Solutions for the UK and India.
- Natural Fibre Based Hybrid Yarns and Their Thermoplastic Composites.
- Euro-India Forum for Nanomaterials Research Coordination and Cooperation in Sustainable Energy Technologies.
- Sustainable e-Infrastructures across Europe and India (EU-IndiaGrid2).
- Development of a Synergistic Computational Tool for Material Modeling, Process Simulation and Optimization of Optical Glass Molding.
- Design of Innovative Closed-Loop Ecological Sanitation Solutions and their Techno-Economics Evaluation.

International Consultancy Assignments:-

- Editorial Work for JAMR.
- Security Techniques/Algorithms.
- Optimal Design of Rain Water Harvesting Kunds (Cisterns) for Unreserved Populations in Rajasthan.
- Investigations on Coal Ash Resistivity.

To achieve enhanced industrial participation in engineering education, the Institute has undertaken industry sponsored Masters Degree programmes such as "VLSI Design Tools & Technology", which is operated through IRD Unit.

In an effort to encourage Research & Development activities amongst the students, undergraduate students at the Institute are encouraged to inculcate their interest towards research while pursuing studies. To achieve this, a scheme called Summer Undergraduate Research Award (SURA) is in operation for last 17 years. Under this scheme the students are required to submit research project proposals in association with identified academic staff of the Departments/Centres to act as Facilitator, in the area of the proposed Research. During the current year, **34** SURA projects have been selected to be undertaken by the undergraduate students during summer vacations of 2010.

To encourage technology development activities, the IRD Unit has launched a scheme entitled "Technology Development Project Initiation Award for Students (TDP-IAS)" for Undergraduate Students (in their 3rd semester onwards) and Postgraduate Students (individually or as a team) of the Institute. The awards are considered for project proposals meeting the following broad objectives: (a) to build a fully working prototype which has potential to lead to an innovative product, or (b) to build a working model that may be required for participating in a prestigious national or international technical contest, or (c) to provide a technological solution to a real life problem of interest to the Institute. Under this scheme, the students are required to submit project proposals in association with identified academic staff of the Departments/Centres of the Institute, in the area of the proposed Research & Development Project, to act as Facilitator. During 2009-10, **five** project have been selected under TDP-IAS scheme.

IRD Unit plays an important role by providing a one-time grant of Rupees One Lac to new faculty member who joins the Institute. The assistance is being given to the new faculty so that they can initiate new projects, which may subsequently be submitted to various funding agencies.

Assistantships/Fellowships are also provided by IRD to 5th year Ph.D. students. It has now been decided to extend such support in the form of Gap period assistantship for both M.Tech./MS(R) and Ph.D. students who are drawing their fellowship/assistantship from the projects. These assistantships will be provided to the students once the projects get over and there is no other project to pay them assistantship. M.Tech./MS(R) students can be supported for a maximum gap period of six months and Ph.D. students would be supported for a maximum gap period of one year.

IRD Unit offers "**IRD Fellow**" positions to those superannuated Professors/CSO/ CDE(SG) of the Institute who have been actively engaged in research, development & teaching programmes of the Institute in the preceding years, to enable them to pursue active R&D in their field of specialization and participate in R&D programmes and development of new programmes at the Institute within their field of competence. The modalities and other terms and conditions of appointment of "IRD Fellow" are similar to those applicable to the Institute Emeritus Fellows. At present, three superannuated faculty is working as IRD Fellow.

IRD has also undertaken the task of operating of Chair Professorships. In addition to 15 ongoing chairs, IRD has notified one more Chair Professorship for operation during 2009-2010. IRD has also been assigned the responsibility to operate the Awards in project mode given by certain Prominent Institutes/Organisations to IIT Delhi's faculty.

11.3 CENTRAL WORKSHOP

Workshop is an educational platform where science is translated into technology. The Institute has a well-equipped Workshop, which caters to the needs of undergraduate students in basic workshop practice. The students are Imparted practical knowledge in the areas like machining, welding and cutting, molding, smithy, sheet metal, carpentry and fitting. These shops have been continuously updated with the modern facilities with a view to focusing on need for developing green technologies.

Continuous process of meeting obsolescence in terms of equipment, machinery, tooling and technology is followed to ensure state of the art training programmes for the students. The Central Workshop on the other hand is the

mainstay for all UG/PG manufacturing course related practical, particularly in the areas of foundry, welding and machining. IT also caters to the complete needs of fabrication and machining work related to the B.Tech., M.Tech. and Ph.D. projects in the Department of Mechanical Engineering and provides support to the demands of other departments wherever they are not able to handle the work on account of facilities, material not available with them or in the case of lack of trained manpower.

The facilities in the unconventional machining such as EDM, ECM have been added recently to impart training in these state of the art technologies. With the addition of these facilities, the Central Workshop could be considered as one of the most modern training facilities in the country and it more than meets the International Standards.

11.4 TRAINING AND PLACEMENT (UNIT)

Training and Placement Office 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 whose functional requirements of high calibre engineers and scientists are best met by graduate and post-graduate students of the Institute.

Training

Pre-final year students of B.Tech., Dual Degree, and Integrated Programmes, having minimum of 90 earned credits at the end of 5th semester, are required to undergo 50 working days' mandatory practical training during summer vacations following the 6th semester in partial fulfilment of their degree requirements. Industries, which have been giving employment to the students in the past, are approached to organise practical training as well. They are also encouraged to give projects to the students to make practical training more meaningful. Beside, efforts are made to obtain maximum possible number of stipends during training by personal dialogue with the executive of various industries.

Ground Rules for practical training are promulgated in August/September every year by Training & Placement Committee. The seats are obtained with the active participation of Nucleus Committee of departments which have student members guided by a faculty coordinator. The allotment of training seats is done on the basis of merit-cum-choice of the student. In some case students are selected by the company through an interview process.The Institute does not recognize any training under-gone by students violating the Rules enacted by the Senate.

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 activities of the Institute both from academic and extra-curricular point of view is given to organisations that have hitherto neither trained nor placed our students. The students play a major role in the conduct of placement on the campus. Central students team and Nucleus committees of the Departments, consisting of students and faculty members, help identify new industry and organizations as well arrange lectures/ workshops for the benefit of the student community.

General

Lectures are also given to students to supplement the above information and special talks / workshops are organised on various subjects such as "Career Counselling", interview techniques and modes of communication. The unit remains in touch with the Alumni Association of IIT Delhi to obtain their valuable advice and guidance for the students. Besides, relevant data on various industrial and technical organisations are collected, sifted and complied and an analysis of past training and placement activities are presented to the students to help them decide their future course of action. Ground Rules on placement activities are formulated to ensure that adequate justice is done to all the students depending on their merit and aptitude.

The Training and Placement Office serves as an effective link between the Institute and the industry and helps create and develop valuable relationship to mutual advantage of each other.

11.5 CENTRAL LIBRARY

The IIT Delhi Library System consists 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 9000 registered users.

The Library also houses the headquarters of the "INDEST-AICTE Consortium" that provides access to electronic resources to its member institutions comprising of more than 1072 members including 48 core member institutions, 60 AICTE-supported institutions and 964 institutions who have joined the consortium under its self-supported category.

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. It remains open from 8.45 a.m. to 9.00 p.m, from Monday through Friday during Minor and Major examination upto 12.00 mid-night and on Saturdays, Sundays and Public Holidays from 10.00 a.m. to 6.30 p.m.

Library Resources

Collection

The Central Library, IIT Delhi has a strong collection consisting of more than three lakhs documents comprising of books, standards, specifications, theses, CD-ROM databases, bound volumes of journals and video cassettes pertaining to physical sciences, engineering and technology, biotechnology, computer and information technology, social sciences and management. The Library has an active collection 21,500 book and 53 e-books under Text Book and Book Bank Schemes to support undergraduate studies. The reference collection in the Library is maintained separately and is categorized into atlases, bibliographies, handbooks, directories, dictionaries, encyclopedias and technical data. The Library provides web-based access to electronic journals and CD ROM databases and caters to the demand-based procurement of specialized documents such as patents, standards and specifications.

Video Library

The Library is equipped with video viewing facility consisting of four VCPs and video display units. It has a collection of more than 1,585 video cassettes. All these videos are now converted to CDs and kept in the Computer Application Division for viewing for the students.

Electronic Journals and Online Bibliographic Databases

The Library subscribes 714 current journals in print with a back volumes running into more than 1,03,942 bound volumes of journals. Of 714 Journals subscribed in print, 421 journals are also accessible online from the publisher's web site. Links to these 544 electronic journals are available through the Library website as well through the Libsys Web OPAC.

Besides, the Institute has access to over 10,000 full-text electronic journals and 6 bibliographic databases from a number of publishers and aggregators through the INDEST-AICTE-AICTE Consortium. The INDEST-AICTE Web Site (http://www.indest.iitd.ac.in/)or (http://paniit.iitd.ac.in/indest) hosts search and browse interfaces to locate these journals and their URLs. Details of resources made accessible to IIT Delhi through the Consortium along with their URLs are given in "Library Guide and Information Leaflets". Tutorials on e-resources accessible through the INDEST-AICTE Consortium are available on the INDEST-AICTE Web Site and are also published in "Compendium for the Members of the INDEST-AICTE Consortium". Copies of the Library Guide and Compendium are available in the Library.

Besides access to current e-journals, the Library has also purchased backfiles of electronic journals from a number of publishers / aggregators from their volume one onwards on "one-time payment and perpetual access basis". The backfiles purchased by the Library includes: Elsevier's Science Direct (24 subject collections, 1186 e-journals), Wiley InterScience (3 subject collections, 27 e-journals), Springer's Open Journal Archives (11 subject collections, 812 e-journals), Jstor (7 subject collections, 1548 journals) and Project Muse (296 Journals).

Electronic Books

The Institute has access to electronic books from the following publishers / aggregators:

- Elsevier Book Series on Chemistry, Business, Management & Economics, Life Sciences and Methods in Enzymology through the Science Direct (http://www.sciencedirect.com).
- Springer's Electronic Books (about 100 e-books) (http://ebooks.springerlink.com).
- Wiley InterScience Electronic Books (about 100 e-books).
- E-brary (29368 books).

Computer and Networking Infrastructure

The Library has its own sub-LAN, which, in turn, is connected to the Campus LAN. It has 97 PCs and eight servers spread over three floors of the Library. All 97 PCs and eight servers are connected to the Campus LAN.

The Library is a part of fibre optic-based campus-LAN. Of 97 PCs in the Library, 63 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. A module of the Libsys specially developed for computerization of Book Bank Services at the Library was successfully implemented during the year. 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 1,35,000 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 the regular basis. Besides, the Central Library has two databases in-house 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.

Library Services & Facilities

Reader's Assistance

The Library provides assistance to users in activities 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 the facilities and services of the Library.

Borrowing Facilities

The library members, according to their borrowing category can borrow stipulated number of books at a time against their bar-coded patron card.

Inter Library Loan (ILL) and Resource Sharing Facility

The Library arranges to procure books and journals from other libraries in Delhi on Inter Library Loan (ILL). Photo copies of research articles are also arranged from other IITs under resources sharing agreement signed by all IITs. The JCCC interface made available through the INDEST-AICTE Consortium facilitates inter-library loan and document delivery amongst IITs and IISc. The IIT Delhi, as headquarters of the INDEST-AICTE AICTE Consortium, has supplied more than 4910 articles to the members of the INDEST-AICTE Consortium through JCCC.

Photocopying Facility

The Library provides photocopying facility within the premises of the Library 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 duration of a semester against payment of 10% of total cost of book as rental charges. However, students belonging to Scheduled Castes and Scheduled Tribes are exempted from the payment of rental charges.

Text Books Facilities

The textbook collection in the Library consists of books prescribed in the courses of study or those recommended by the Institute faculty. The text books are either issued for overnight or are available only for reference. Students can borrow two books at a time from Text Book section between 2 to 6 p.m.

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:

Indian Standards	:	http://10.116.2.102/bis/
ASTM Standards	:	http://10.116.2.102/astm/
IES Standards	:	http://10.116.2.102/iec/

Home Page of the Central Library, IIT Delhi

The Central Library hosts a comprehensive Home Page as a part of the Institute's web site. The Library Home page serves as an integrated interface for all computer and web-based services available from the Central Library. The interface, available at **"http://www.iitd.ac.in/library/"**, offers the following computer and web-based services:

- Recent Additions to the IIT Library.
- Electronic Resources on the Internet.
- Electronic Reference Library (ERL) Services.
- CD ROM Databases and CD ROM Search Services.
- Web-based Library OPAC.
- Access DELNET Databases.
- Scanned Images of Old and Fragile Volumes of Journals.
- Web Access to Journals subscribed in Print.

Institutional Repository at IIT Delhi (http://eprint.iitd.ac.in/dspace/)

The Eprints @ IIT Delhi has been set-up in 2004 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 protocols and interoperability standards. The Eprints@IIT Delhi provides a platform for faculty and researcher 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.

INDEST-AICTE-AICTE Consortium

The "Indian National Digital Library in Engineering Sciences and Technology (INDEST-AICTE) Consortium" was set-up by the Ministry of Human Resource Development (MHRD) on the recommendation of an Expert Group appointed by the Ministry. 48 centrally-funded Government institutions including IITs, IISc Bangalore,IISERs, NITs , IIITs and IIMs are core members of the INDEST-AICTE Consortium. The Ministry provides funds required for providing differential access to electronic resources subscribed for the Consortium to the core members through the Consortium Headquarters set-up at the IIT Delhi. The Consortium was re-named as INDEST-AICTE Consortium in December 2005 with the AICTE playing pivotal role in enrolling its affiliated engineering colleges and institutions as members of the Consortium for selected e-resources at much lower rates of subscription.

The total number of members in the consortium has grown to 1072 members including 48 core member institutions, 60 AICTE-supported institutions and 964 institutions who have joined the consortium under its self-supported category. IIT Delhi continues to be Head Quarters of these activities on behalf of Ministry of Human Resource Development, Govt. of India. During 2009–2010, Prof. G.P. Agarwal was National Coordinator of INDEST-AICTE Consortium. Prof. Surendra Prasad, Director, IIT Delhi was the Chairman of National Steering Committee which formulated guidelines of the Consortium.

11.6 OTHER FACILITIES

The following Central Facilities are located in the Departments/Centres indicated against them and are looked after by their respective co-ordinators. Services are available on payment basis and are available to all faculty and students as well as for outside individuals and organizations.

Facility	*Department/Centre*
Glass Blowing Workshop	Chemistry
NMR	Chemistry
SAM/ESCA	Physics
TEM	Physics
SEM	Textile Technology
Educational Technology	Educational Technology Services Centre
ICPE Spectroscopic	Industrial Tribology, Machine Dynamics & Maintenance Engineering Centre
GC/MS	Industrial Tribology, Machine Dynamics & Maintenance Engineering Centre
Mechanical Fabrication	Instrument Design & Development Centre
Liquid Nitrogen Facility	Centre for Polymer Science and Engineering

ADMINISTRATIVE STRUCTURE

THE VISITOR

Smt. Pratibha Patil, President of India

THE BOARD OF GOVERNORS

R.P. Agrawal (Chairman)

Director of the Institute

Surendra Prasad

Nominees of the State Governments

V.C.Sharma
N.K. Verma
Anand Prakash
Rajneesh Arora

Nominees of the I.I.T. Council

Ashok Thakur
Niranjan Patnaik
Rajendra S. Pawar
M.N. Reddy

Nominees of the Senate

H.C. Gupta
B.N.Jain (E.O.L)

Secretary

Acting Registrar, A.L. Vyas

DIRECTOR

Surendra Prasad

Deputy Directors

M. Balakrishnan	Faculty
S.M. Ishtiaque	Administration

Deans

Ashok Gupta	Alumni Affairs and International Programmes
S.N. Singh	Industrial Research and Development
K.Gupta	Postgraduate Studies and Research
Shashi Mathur	Students
Santanu Chaudhury	Undergraduate Studies

Associate Deans

A.K.Ghosh	Industrial Research and Development
S.K.Saha	Student Affairs
T.R.Sreekrishnan	Undergraduate Studies

Acting Registrar

A.L. Vyas

Surendra Prasad, Chairman (Director)

Deputy Directors

M. Balakrishnan
S.M. Ishtiaque

All Professors (or equivalent)

G.P. Agarwal
V.K. Agarwal
A.K. Agarwala
Ashwini K. Agarwal
S.K. Atreya
R. Algirusamy
Avinash Chandra
Sneh Anand
Suhail Ahmad
Anshul Kumar
M.K.G. Babu
R. Bahl
R.K. Baisya
R. Balasubramanian
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S. Banerjee
P.K. Banerjee
D.K. Banwet
S. Basu
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Ranjan Bose
A.S. Brar (on lien)
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Charusita Chakravarty (Ms.)
Devi Chadha (Ms.)
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S.K. Dube
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K. Gupta
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M.P. Gupta
S.K. Gupta (AM)
S.K. Gupta (CSE)
S.K. Gupta (CHE)
M. Hanmandlu
K.C. Iyer
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B.N. Jain (E.O.L.)
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S.K. Jain
Sanjeev Jain
V.K. Jain
B. Jayaram
Jayadeva
Girija Jayaraman (Ms.)
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S.D. Joshi
S.R. Kale
N.C. Kalra
Prem Kumar Kalra
Arun Kanda
Tara C. Kandpal
Santosh Kapuria
I.N. Kar
Subrat Kar
S.C. Kashyap
Ravinder Kaur (Ms.)
S.C. Kaushik
Saroj Kaushik (Ms.)
J.M. Kate
Mukesh Khare
Amulya Khurana (Ms.)
V.K. Kothari
S.K. Koul
Ajit Kumar
Arun Kumar (Phy)
Arun Kumar (CARE)
S. Arun Kumar (CS&E)
Rakesh Kumar
Madan Gopal
Manju Mohan (Ms.)
S.N. Maheshwari
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Shashi Mathur
Maithili Sharan
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S.N. Mukhopadhyay
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Y. Nath
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P.S. Pandey
Sunil Pandey
D.K. Pandya
B.S. Panwar
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Rajendra Prasad
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R.N. Ram
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T.R. Rao
M.R. Ravi
Anjan Ray
A.R. Ray
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R. Sagar
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Puneet Mahajan
Sandeep Sen
Vikram Sahai
Ravi Shankar (Chy)
Ravi Shankar (DMS)
D.T. Shahani
Anurag Sharma
D.K. Sharma
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R.K. Sharma
M.R. Shenoy
Bhim Singh
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Harpal Singh
Jai Deo Singh

S.N. Singh
S.P. Singh
S.N. Sinha
R.K. Soni
Amrit Srinivasan (Ms.)
A.K. Srivastava
T.R. Sreekrishnan
J.P. Subrahmaniam
Sudhir Chandra
Suneet Tuli
Sunil Nath
Subhash Chand
Sushil
N. Tandon
G.N. Tiwari
K. Thyagarajan
V.K. Tripathi
V. Upadhyay
V.D. Vankar
S.V. Veeravalli
Vinod Chandra
G.S. Visweswaran
S.S. Yadav

Three Educationists from Outside IIT Delhi

Amit Roy
Pratap Bhanu Mehta
Pratima Rani Bose

Heads of Deptt/Centres other than Professors

N.K. Jain

Head, Central Library

Jagdish Arora, (on lien)

Head, Central Workshop

P.V. Rao

One of the Wardens

A.K. Nema

Chairman, Grade & Registration (UG&PG)

Six Members of Faculty

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Bharati Puri (Ms.)
Niladri Chatterjee
Sangeeta Kohli (Ms.)
Nivedita Karmakar
K.Achuta Rao

Three Alumni Representatives

Sanjay Puri
Ravi Kapoor
Shashi Munjal

Four Student Representatives

Yudhveer Thakkar
Sayan Haidar
Sarla Meena (Ms.)
Anil Malik

Registrar (Acting)

A.L. Vyas (Secretary)

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G.S. Visweswaran	Board for Students Welfare

LIBRARY

G.P. Agarwal	Professor-in-Charge (Library)

Assistant Librarian

J.P. Srivastava

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Kanika T. Bhal(Ms.)	Advisor, Foreign Students
Viresh Dutta	Advisor, SC/ST Students
Rajesh Prasad	Coordinator, NSS
Brijesh Lall	Coordinator, NCC
R.K. Varshney	SC/ST Preparatory Course

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S.Arun Kumar	JEE Chairman
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M.Jagadesh Kumar	Chairman (GATE/JAM)
G.S. Visweswaran President BSW	Head, Counselling Service (Ex- officio)
Santosh Satya(Ms.)	Hindi Cell (Head)
M.R.Ravi	Vice Chairman (GATE/JAM)
Santosh Kapuria	Grade & Registration (UG)
T.R. Sreekrishnan	Grade & Registration (PG)

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M.Tech. Programmes

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S.N. Maiti	Polymer Science & Technology
M.G. Dastidar	Energy Studies
Naveen Garg	Computer Applications
M.Jagadesh Kumar	VLSI Design, Tools & Technologies
D.T. Shahani	Instrument Technology

M.Tech. and Research Programmes

Subrat Kar	Opto Electronics & Optical Communications

M.Des. Programme

N.K.Jain	Industrial Design

Research Programme

Dinesh Mohan	Transportation Research and Injury Prevention Programme (TRIPP)

Others

P.K. Kalra	Quality Improvement Programme/ Continuing Education Programme/OCDC
Subrat Kar	Bharti School of Telecommunication
Huzur Saran	School of Information Technology
B. Jayaram	School of Biological Sciences.

COORDINATORS OF CENTRAL FACILITIES

(Located in Departments/Centres)

N.D. Kurur	NMR
D.K. Pandya	Liquid Nitrogen
Kushal Sen	SEM
Mukesh Chander	SAM/ESCA
I.P. Singh	Mechanical Fabrication
P.S. Pandey	Glass Blowing Workshops
G.B. Reddy	TEM
B.R. Mehta	AFM+STM (Atomic Force Microscope+Scanning Tunneling Microscope)
B. Jayaram	Supercomputing facility for Bio-informatics and computational Biology
P.V.M. Rao	Rabid Prototyping
A.K. Mittal	Gas Chromatography-Mass Spectrometery (GC-MS)
Saroj Mishra (Ms.)	MALDI/MS Facility

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K.Gupta	Institute Lecture Series Committee
Santanu Chaudhury	Standing Committee for Convocation 2010
Santanu Chaudhury	Kendriya Vidyalaya Mangement Committee
Santanu Chaudhury	Nursery School Advisory Committee
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D.T. Shahani	Commercial Establishments Monitoring Committee
D.T. Shahani	Communication Advisory Committee (Telephone Advisory Committee)
D.T. Shahani	House Allotment Committee
D.T. Shahani	Subletting Committee
D.T. Shahani	Air-conditioning Committee
O.P. Sharma	House Building Advance Committee
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S.S. Yadav	Institute Grievance Committee
Santosh Satya(Ms.)	Holistic Health Committee
S.M. Ishtiaque	Security Advisory Committee
M. Balakrishnan	Management Committee of the Benevolent Fund Scheme
Surendra Prasad (Director)	Executive Committee of IITD Staff Welfare Scheme
S.N. Singh	Area Committee for East Side of the Campus

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Sh.R.P.Agrawal (Chairman)

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Surendra Prasad

Nominees of the Central Government
(Representative of MHRD)

Sanat Kumar Ray

Nominees of the Board of Governors

Anand Prakash

Ashok Thakur

H.C. Gupta

A.L. Vyas *(Secretary)*

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(Sh. Rajendra Kalla, SE, DCC-III)

Representative from the MHRD
Rashmi Chowdhary (Ms.) (Director, (TS-1) Deptt.of Secondary and Higher Education)

J.R. Bhalla

Sanjay Gupta
Institute Engineer (ex-officio)

A.L. Vyas, *Registrar (ex-officio), Secretary*

D.T. Shahani,
Permanent Invitee Chairman, Estate & Works

Shri P.B. Vijay - Member

Er. S. Ramanujam

P.S. Rana *(Special Invitee)*

S.M. Ishtiaque (*Special Invitee*)

D.D. (Admn), IITD

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Apurba Dass	:	Nilgiri
B.K. Panigrahi	:	Aravali
Manju Mohan(Ms.)	:	Kailash
T.R. Sreekrishnan	:	Jwalamukhi
S.K. Khare	:	Shivalik
Prashant Mishra	:	Karakoram
A.K. Nema	:	Vindhyachal
S.K.Saha	:	Nalanda/IP/ New Vindhyachal
Kamlesh Singh(Ms.)	:	Himadri
B.D. Gupta	:	Satpura
P. Senthilkumaran	:	Zanskar
K.N. Jha	:	Hostel `D'

CENTRAL WORKSHOP

Professor and Head

P.V. Rao, Ph.D. (IIT/D).

INDUSTRIAL RESEARCH AND DEVELOPMENT

Dean	:	S.N. Singh
Associate Dean	:	A.K.Ghosh

PLANNING UNIT, TRANSPORT UNIT AND GUEST HOUSES

Prof.-in-Charge (Planning & Publication)	:	R.Chattopadhyay
Prof.-in-Charge (Transport)	:	J.P. Subrahmanyam
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TRAINING AND PLACEMENT

Prof.-in-Charge : Kushal Sen

HINDI CELL

Head

Santosh Satya(Ms.)

STUDENT COUNSELLING SERVICE

Head

G.S. Visweswaran

COUNSELLOR

Rupa Murghai

ADMINISTRATIVE COMPUTERISATION SUPPORT SERVICE

Head

S.Banerjee

CVC

Chief Vigilance Officer : Subhash Chand

RTI

Public Information Officer : Vivek Raman

Appellate Authority : A.L. Vyas, Registrar

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K.P. Singh	Deputy Registrar (PGS&R and Legal Cell)
M.K. Gulati	Deputy Registrar (Accounts)
P.G. Basak	Deputy Registrar (Audit)
V.K. Wadhwa	Deputy Registrar (E-I & Conference)
Nanak Chand Chauhan	Deputy Registrar (Student Affairs,O&M, and R&I)
P. Kumaresan	Assistant Registrar (SS) (Stores)(On Lien)
R.K. Gupta	Assistant Registrar (IRD A/C)
K.K. Bhattacharjee	Assistant Registrar (IRD, CDN & SP Section)
Vivek Raman	Assistant Registrar (Planning & PIO (RTI)
Atul Vyas	Assistant Registrar (AA&IP)
V.K. Vashistha	Assistant Registrar (E-II)
Anup Kuksal	Assistant Registrar (Audit/ Accounts)
Sanjay Gupta	Institute Engineer (On Deputation)
G.K. Taneja	Executive Engineer
K.M. Vijaya Kumar	Executive Engineer
Anuj Gaur	Executive Engineer
Y.Nooruddin	Executive Engineer
Rafat Jamal	Assistant Executive Engineer (under suspension)
V.K. Bharaj	Assistant Executive Engineer
Hitendra Govil	Assistant Executive Engineer
K.P. Mishra	Assistant Executive Engineer
S. Mohan	Assistant Executive Engineer
Prem Kumar	Assistant Executive Engineer
Brahm Prakash	Assistant Executive Engineer
Ashok Kumar	Assistant Executive Engineer
Devender Kumar	Assistant Executive Engineer
Rupa Murghai (Ms.)	Student Counsellor
S.K. Aggarwal	Chief Medical Officer (SS) and Head, Hospital Services
S.B. Pathak	Senior Medical Officer (Homeopathic) (SS)
Lily Khosa (Ms)	Medical Officer (SS)
Renu Misurya (Ms)	Medical Officer (SS)
Ajay Kumar Jain	Medical Officer (SS)
Anila Khosla (Ms)	Medical Officer (SS)
M.K. Sagar	Medical Officer (SS)
Prabhpreet Sethi (Ms.)	Medical Officer
Rakesh Kumar Khandelwal	Medical Officer
B.N. Yadav	Security Officer (SS)
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Chatar Singh	S.T.O. (SG)
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INDIAN INSTITUTE OF TECHNOLOGY DELHI

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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 sprit and letter of the Honour Code.

I realize 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 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;
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Date:_____

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Name_____

Entry no._____

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