भारतीय प्रौद्योगिकी संस्थान रुड़की

Indian Institute of Technology Roorkee

Ph.D. Admission for Spring Semester 2015-16

INFORMATION BROCHURE

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HOW TO APPLY

The candidate is required to register and fill the application online from August 26, 2015 to September 17, 2015 by accessing ***http://pgadm.iitr.ernet.in.*** After finalizing the application, download the online filled application and Bank Challan (in triplicate) simultaneously. The requisite fee of Rs. 200/- for GEN/OBC and Rs. 100/- for SC/ST/PD category candidates must be deposited for each department in any branch of State Bank of India throughout the country through bank challan on next working day of finalization of online application and or before the last date i.e. **September 19, 2015.** Bank will retain a copy and will return two copies to you. Out of two copies, retain the Candidate's copy with you and attach the IITR's copy with the print out of downloaded application form and send it to PG admission office.

Note:-

1. ***The fee shall not be accepted through any other mode.***
2. **Separate application be sent for each department/centre and for each department/centre separate fee shall be required. However, total fee be deposited together using single challan. An original copy of challan be used with the application form for one department and Xerox copy of the challan form can be attached for other departments (if applicable).**

Apply online (Website Open)	**August 26, 2015**
Last Date for Applying Online (Website Closure)	**September 17, 2015 at 5:30 P.M.**
Last date for deposit of application fee	**September 19, 2015**
Receiving of downloaded Application Form at PG Admission Office, IIT Roorkee	**September 22, 2015**

Note: 1. Admission will be offered subject to availability of seats, faculty in the Specialization and the Institute Assistantship.

2. There is no vacancy under Institute Assistantship in following deptt/centres (a) WRD&M, (b) C-TRANS, (c) Centre for Nanotechnology, (d) Disaster Mitigation & Management, (e) Institute Instrumentation Centre
3. Hostel Accommodation will be provided, if available.

1. THE INSTITUTE

Indian Institute of Technology Roorkee has its roots in the Roorkee College established in 1847 as the first engineering college in India, which was soon rechristened as Thomason College of Civil Engineering in 1854 after its greatest mentor James Thomason. After about 100 years of distinguished services, the college was elevated to University of Roorkee as the first Engineering University of independent India on November 25, 1949. It was converted to IIT on September 21, 2001. It has now 23 academic departments/centres offering undergraduate courses in engineering and architecture, dual degree programmes and Integrated Dual Degree courses in M.Sc./Engineering and around 48 postgraduate courses in engineering, architecture, sciences, computer applications and business administration besides research programmes at doctoral level. It has three campuses, main campus at Roorkee and other two at Saharanpur and Greater Noida

IIT Roorkee has a highly qualified and motivated faculty of about 395 members who are engaged in research and consultancy in addition to teaching. The faculty members offer their expertise through consultancy services to private/public sector industries as well as to Government agencies. The institute has about 4450 undergraduate students, 2130 postgraduates and over 1425 research scholars.

There are a number of academic and research centres engaged in interdisciplinary research, and many collaborative programmes exist with institutions in India and abroad. Several central facilities exist such as Mahatma Gandhi Central Library having more than 3.65 lac volumes of books and periodicals, Information Superhighway Centre with Internet connectivity, an Educational Multi-Media Research Centre with full-fledged television studio, a modern Computer Centre and Institute Instrumentation Centre with highly sophisticated analytical instruments.

The Institute prepares students to meet ever-increasing technological and social challenges with its traditions of self-discipline, hard work, all-round personality development and innovative approach to problems.

IIT Roorkee is fully residential, with well-designed hostels (*Bhawans*) both for boys and girls, sprawling sports ground, hobbies club, Hospital, a modern swimming pool, boat club and a host of facilities for different games including Tennis, Squash and Billiards. Societies and Associations along with activities like NCC, Rangering and Rovering, Mountaineering and Trekking provide excellent opportunities for self-development.

2. ROORKEE TOWN

Roorkee, a quiet town of moderate size in the district of Hardwar (Uttarakhand), is located on the banks of the Upper Ganga Canal, which takes off at Hardwar. It is about 30 km south of the Shivalik range of the mighty Himalayas, about 170 km to the north of Delhi and is situated on the Amritsar-Howrah main railway line. Roorkee is linked by rail to many important mega cities such as Delhi, Kolkata, Chennai and Mumbai. Roorkee is also well connected by road, being located on the Delhi-Hardwar National Highway (NH 58), and on the Roorkee – Panch Kula Highway (NH 73). Roorkee (Latitude 29º 52' N and Longitude 77º 53'52" E) is 268 m above mean sea level and has a cold winter. The summer months, though hot, are moderated by the proximity of the Shivaliks. The rainy season is mainly between July and September with an average rainfall of 1050 mm.

Roorkee town is an important centre of engineering activity. Apart from the IIT Roorkee, which is situated in a 150-hectare campus, Roorkee also has the Central Building Research Institute, the National Institute of Hydrology, the Irrigation Research Institute, the Irrigation Design Organization, the headquarters of Bengal Engineering Group & Centre along with an important Army base.

The Institute campus is 2.5 km from the Roorkee Railway Station and is only 200 m from the Roadways Bus Stand.

3 ACADEMIC DEPARTMENTS/CENTRES

Alternate Hydro Energy Centre (AHEC)

Alternate Hydro Energy Centre established in the year 1982, is engaged for the development of small hydropower, and other renewable energy sources and for the conservation of water bodies. The centre offers M Tech Programmes in two specialized areas, namely, Alternate Hydro Energy Systems and Environmental Management of Rivers and Lakes.

The M.Tech programme in "Alternate Hydro Energy Systems" covers the design/selection aspect of different structures/equipment associates with small hydropower and renewable energy projects and is suitable for candidates to take up the responsibilities of investigation, surveys, planning, designs, evaluation, installation of such renewable energy projects.

The second M.Tech Programme in "Environmental Management of Rivers and Lakes" is offered as an interdisciplinary programme to create the specialists for restoration, conservation and management of environmentally degraded rivers and lakes. Environmental Management of Rivers and Lakes involves planning, designing, preparing, executing and monitoring of projects to deal with catchment treatment, pollution and abutment in a sustainable manner in catchment area, rural areas and urban

areas. Two institute elective courses for undergraduate students in each semester and Ph.D. programme are also offered by AHEC.

The centre also provides expert support on different aspects of small hydropower and other renewable energy development to government and private organizations. International and national short-term training programmes are conducted regularly by AHEC to train the professionals.

Architecture and Planning

The Department of Architecture and Planning, Indian Institute of Technology Roorkee was started in the year 1956-57 when architectural education in the country was at its nascence. The department offers B. Arch., M. Arch./ MURP and PhD degree programmes. It carries the distinction of being the first in the country to Institute a Masters Degree course in architecture (M. Arch.) in 1969-70 followed by Masters of Urban and Rural Planning (MURP) in 1973-74. Students with degree in Architecture can pursue for M.Arch programme, whereas the MURP programme is offered to students with bachelor degree in Architecture, Planning and Civil Engineering.

The Department continues to be marked as a keystone of architectural education and research with a committed and well qualified faculty. The department also has the distinction of carrying out Doctoral and sponsored research work in the area of Architecture & Planning over the past three decades. Research Projects of national importance are carried out by the faculty and research scholars in the discipline of built environment and its associated issues. Short-term training programme on variety of relevant topics are offered by the Department regularly.

Biotechnology

The Department of Biotechnology, established in 1981, offers 2-year M.Sc. Biotechnology and Ph.D. and B.Tech. Biotechnology programmes. Research is carried out in identified thrust areas in the field of Molecular Biophysics, Genetics, Microbiology, Animal and Plant Biotechnology, Protein Biochemistry and Crystallography, Bioinformatics, Biochemical Engineering and Molecular Biology. Several sponsored research projects have been undertaken in the specialized areas of protein-DNA interactions, 3D structure and Molecular Dynamics of biological molecules based on Nuclear Magnetic Resonance (NMR) spectroscopy, DNA-Anticancer Drug interactions, Structure based Drug Designing, Plant defense proteins, Genetic Engineering of Nitrogen Fixation, Genome and Genomics of Wheat and Rice, Plasma Membrane based Enzymes, Therapeutically important Viral Enzymes and Proteins, Molecular Mechanism of Hormone Action and Endocrine Disruptors, Microbial Biosynthesis of Enzymes and Organic Acids, Biocatalysis, Biofuels, Biofilms, Bioremediation, Cell Surface Antigens, Molecular Biology of abiotic stress in plants, plant therapeutic proteins, biosensors, aptamers, drug discovery for antimicrobials and microbial pathogenesis. Research collaboration has been initiated/exists with institutions such as Tata Institute of Fundamental Research (TIFR) Bombay, Institute of Genomics and Integrative Biology Delhi, Central Drug Research Institute (CDRI) Lucknow, International Centre for Genetic Engineering and Biotechnology (ICGEB), All India Institute of Medical Sciences (AIIMS) New Delhi, Punjab Agricultural University Ludhiana, Indian Agricultural Research Institute (IARI) New Delhi, National Dairy Research Institute (NDRI) Karnal & Birla Institute of Technology & Science (BITS) Pilani-Goa campus.

Chemical Engineering

The Department of Chemical Engineering imparts instructions to students at the undergraduate and postgraduate level leading to B.Tech. and M.Tech. degrees in Chemical Engineering. M.Tech. programmes are offered in two specialized areas, namely. Computer Aided Process Plant Design and Industrial Pollution Abatement. The Department also runs an Integrated Dual Degree Programme {B.Tech. (Chemical Engg) plus M.Tech. (Hydrocarbon Engg.)}. The Department also admits students for Ph.D. programme.

The M.Tech. programme of the Department has the highest approved intake in the country. The programme in Hydrocarbon Engineering are unique in the IIT system and fulfill the crucial needs of the industry. The Department has well equipped laboratory facilities with state-of-art equipment and instruments. New Research laboratories have been established in Air Pollution Abatement, Fire Engineering, Industrial Safety and Hydrocarbon Testing and Analysis. The Department is well recognized for its industrial academic programmes and fundamental and applied research. The research output of the department in terms of published articles in peer reviewed research journals and industrial consultancy projects is formidable and noteworthy. The Department conducts a large number of continuing education and training programmes for sponsored candidates from industries in the emerging areas of Chemical Engineering.

Chemistry

Department of Chemistry was established in the year 1960 and has completed 50 years of its evolution in the year 2010 maintaining the highest level of academic standards. This department has played an important role in science and scientific endeavors of

IIT Roorkee and has remained an integral part of this institute since its inception. Its distinguished faculty members provide an environment, where the students in B. Tech., M. Tech., M. Sc. and Ph.D. programs learn, explore and discover new chemistry. General areas covered include physical, organic, inorganic and analytical chemistry. The department offers M.Sc. (2 years), M.Tech. (Advanced Methods of Chemical Analysis) and Ph.D. programs in chemistry. The faculty members of this department are also involved in interdisciplinary research in the areas of Environmental Science and Nanotechnology. This department is aiming to be one of the major centers for teaching and research in Chemical Sciences in India.

The department is equipped with the major facilities like : ESI-mass spectrophotometer, Elemental analyzer, AAS, GC-MS, LCMS/MS, Raman Spectrophotometer, Rheometer, Surface Area Analyzer and Microwave synthesizer. A 400 MHz NMR is likely to be installed soon. In addition to these, other facilities like UV-Vis, IR and Spectrofluorophotometer, Gas Chromatograph, Cyclic voltammeter and Anodic Stripping Voltameter are available to provide academic excellence as well as industry oriented training to its post-graduate students. Presently, about 120 students are pursuing their doctoral studies. Every year nearly 100 scientific papers are published from the department in the peer reviewed journals. The department was supported by DST under FIST during 1999-2002 and is supported currently for the period 2009-2014.

Civil Engineering

The Department of Civil Engineering of the Indian Institute of Technology Roorkee (formerly University of Roorkee) has an illustrious history and a glorious past and is the oldest and the largest Civil Engineering Department in the country. It has its foundation in the Roorkee College that was established on November 25, 1847 as the first Engineering College, not only in India but also in the British Empire at the time, to train Civil Engineers for managing the construction and operation of the Upper Ganga Canal. The College laid the foundation for modern technical education and the use of Civil Engineering practices in the infrastructure development of the country.

The department has, in the past, produced several eminent engineers who have made notable contributions in the planning and execution of Civil Engineering projects in many parts of India and as well as in other countries. The department offers a four-year course leading to the Bachelor's degree (B. Tech.) in Civil Engineering. In addition to its high quality undergraduate program, the Department also realized quite early the importance of keeping pace with the latest developments in engineering education. Hence, the postgraduate courses in Structural Engineering and Hydraulic Engineering were started in 1953 followed by the postgraduate courses in Soil Mechanics and Foundation Engineering (now Geotechnical Engineering) in 1954, Highway Engineering (now Transportation Engineering) and Public Health Engineering (now Environmental Engineering) in 1957, Advanced Survey and Photogrammetry (now Geomatics Engineering) in 1958 and Building Science and Technology in 1974. At present the Department offers two-year courses leading to the Master's Degree (M. Tech.) in six different specializations. Every year, 135 students are admitted to the B. Tech. courses in Civil Engineering and around 150 students to the M. Tech. courses in different streams of Civil Engineering. The Department has also provided education to a large number of sponsored foreign students through arrangements between the Government of India and the Governments of the concerned nations. A number of specialist and refresher courses are regularly organized by the faculty for practicing engineers and the faculty of other engineering colleges. The Department offers Ph.D. programmes in various disciplines mentioned earlier. About 80 research scholars are presently pursuing their research. The research programs of the Department are being funded by various agencies such as CSIR, DST, MoSRT&H, ISRO, BARC, AICTE etc. Besides teaching and research, the faculty of the Department offers consultancy and R&D services to various public and private sector organizations throughout the country.

Earthquake Engineering

Earthquake engineering education in India started at the Indian Institute of Technology Roorkee (erstwhile University of Roorkee) in 1960, through the establishment of School of Research and Training in Earthquake Engineering. The School was renamed as Department of Earthquake Engineering and became an integral part of the University of Roorkee in 1979. Four major areas of earthquake engineering namely, Structural Dynamics, Soil Dynamics, Engineering Seismology and Seismotectonics, and Instrumentation have been nurtured for more than half a century. Major functions of the Department include teaching and research, and rendering expert advice to various organizations/agencies in all areas of earthquake engineering. This includes earthquake resistant design of structures and systems, such as dams, bridges, power plants, etc. The Department has played a key role at the national level in formulating Indian standard codes of practice for earthquake resistant design of structures.

Several major facilities exist in the department for conducting experiments related to earthquake engineering. The major facilities include: A low cost railway wagon shock table for dynamic testing of full scale structural models, a 3.5 m x 3.5 m computer controlled shake table with a maximum pay-load capacity of 20 tonnes to simulate earthquake ground motion, a quasi static testing laboratory having servo-

controlled dynamic actuator systems and servo-controlled compression testing machine of 300 tonnes capacity, a soil dynamics laboratory equipped with facilities for dynamic testing of soils and foundations, liquefaction table, geotechnical centrifuge and cyclic triaxial testing system, and a seismological observatory having state-of-the-art 3-component digital broadband seismograph to record local, regional and tele-seismic events. The Department has deployed a strong motion network of 300 digital accelerographs in the Himalayan region covering seismic zones V, IV and parts of zone III for the purpose of measuring strong ground motion in the event of major earthquakes and a state-of-the-art 12-station telemetered network deployed in the Garhwal Himalaya to continuously monitor the local seismic activity around Tehri dam.

Earth Sciences

The Department of Earth Sciences is one of the leading departments in the country engaged in teaching and research in the field of Earth Sciences. The main strength of the department is amalgamation of two major divisions of Earth Sciences: Geology and Geophysics under one umbrella. In more than last five decades, department has produced large number of trained Earth Scientists who are the backbone of the Country's Mineral, Oil and Exploration Industry. The pioneer research contributions in different disciplines of Geology and Geophysics have been recognized through the awards and laurels conferred on many faculty members, and through the generous funding received from various funding agencies. The Department of Earth Sciences, formerly the Department of Geology and Geophysics, was established in 1960. During the span of more than five decades the department has become one of the foremost centres of post graduate teaching, research and consultancy in the field of Earth Sciences. The department has been recipient of financial aid under the prestigious Special Assistance and COSIST programmes of UGC (Ministry of Human Resources and Development, Govt. of India). The geological studies in the Institute date back to the middle of the last century when Colonel Sir Proby Cautley (who was responsible for establishing the Thomason College of Engineering) was elected as a Fellow of the Royal Society, London, for his pioneering work on the vertebrate fossils of the nearby Shivalik Ranges. Later Henry Benedict Medlicot, who was also admitted as the Fellow of the Royal Society in 1877, occupied the Chair in Geology and Experimental Sciences at Thomason College. Presently, the department is running two Five Year Integrated M.Tech. programmes. These two programmes were started from 2007 through JEE. One more course viz. M.Sc. (Applied Geology) of two years duration is also being run by the department. Research work leading to Ph.D. degree in several interdisciplinary areas and research and consultancy programmes constitute an integral part of the departmental activities. The faculty is engaged in a number of research projects sponsored by the Govt. of India agencies like UGC, CSIR, DST, ONGC, MOES,MOEF etc. and the consultancy projects sponsored by various industries, and government agencies. The department has Hamrock Society in which all faculty and students are members.

Electrical Engineering

The Electrical Engineering Department was a part of the Thomason College of Engineering from the year 1897, one of the earliest such specializations in the world when the discipline itself was in its infancy. The first batch of Electrical Engineers passed out of the College in the year 1900. This department was, however, closed down in the year 1923 following the recommendation of a special committee that the college may be converted to a purely Civil Engineering Institution. This decision was not to be reversed until on the eve of being converted into a University. The Fortescu Committee advised the resumption of instructions in Electrical Engineering and thus, the present Department of Electrical Engineering came into being in 1946, the first graduates of the new department emerging in 1949. Initially, the department offered courses with options in both Electrical and Telecommunication Engineering. Subsequently, in 1964, the department was bifurcated to form the two Departments of Electrical Engineering and Electronics and Telecommunication Engineering. In 1954, this department was one of the first few ones in India, to start the postgraduate program. Since then, the department has never looked back and since 1964, over 180 Ph.D. degrees have been awarded. Presently the department is running four year undergraduate course in Bachelor of Technology (B.Tech.), five year IDD programme with B.Tech. degree in Electrical Engineering plus M.Tech. degree in Power Electronics and the postgraduate courses in four areas of specializations. In addition, the department is providing excellent facilities to carry out research work for Doctor of Philosophy (Ph.D.) degree, R&D work for sponsored and consultancy projects and testing and consultancy work for industrial problems.

The department has specialization in research areas such as : ANN and fuzzy logic applications, Distribution system planning and operation, Telemedicine, ECG signal analysis and classification, System analysis and optimization, Computer controlled system including process control, Computer controlled multi-quadrant solid-state converters, Condition monitoring of electrical machines/drives, Digital signal and image processing, Data base management, Economic dispatch and planning, Flexible AC transmission system, FPGA based control, High performance computer controlled DC and AC drives, Intelligent instrumentation,

Industrial instrumentation, Medical system modeling, instrumentation and bio-informatics, Modeling and simulation of electric machines, Optimal system operation, Power system protection, monitoring, control and simulation, Power quality, System automation and monitoring, Relay coordination, Reliability engineering, Robotics, System modeling, Process instrumentation and control, Power system automation, Artificial intelligence applications and Voltage stability of power system, Embedded Systems, Sensors & Sensor Networks.

Electronics & Communication Engineering

From a relatively modest beginning with a B.E. programme in Telecommunication in 1957 as part of the Department of Electrical Engineering in the then University of Roorkee, Department of Electronics and Computer Engineering (E.& C.E.) at IIT Roorkee has been continuously striving for excellence in engineering education and research, and, at present, it is one of the largest departments in the Institute in terms of student strength and number of academic programmes. Right from its inception as a separate department in 1964, diversification, focused growth and consolidation of earlier initiatives have been the mission of the Department. In January 2013 a new department named as Department of Computer Science and Engineering was carved out of it and the present department was re-christened as a Department of Electronics and Communication Engineering.

The Department offers the following programmes covering the broad spectrum of Electronics & Communication Engineering disciplines at the Undergraduate and Post-Graduate levels:

- B. Tech in Electronics and Communication Engineering (ECE)
- Integrated Dual Degree Programme – B. Tech (ECE) and M. Tech (Wireless Communication)
- M. Tech in Communication Systems
- M. Tech in Microelectronics and VLSI Technology
- M. Tech in RF and Microwave Engineering

The Department has always been on a high growth path to keep pace with the ever increasing importance of the major disciplines of study and current technology trends. A judicious mix of experienced and young faculty with strong commitment to academics has created an ambience for learning. Both the undergraduate and post-graduate curricular structure and syllabi are updated regularly to reflect recent technological developments, and industrial and national goals. The Ministry of Information Technology has established a Center for Manpower Development in VLSI in the Department and has funded a project on Information Security Education and Awareness. A great number of alumni of the Department have contributed significantly to national development objectives and to academics.

The Department has strong research programmes leading to Ph. D degree in all the areas of Electronics and Communication Engineering. A large number of Ph. D scholars are currently engaged in cutting edge research in the Department. In addition to the well equipped curriculum related laboratories, the Department has many state of the art facilities for assisting research and development in solid state devices, VLSI, RF engineering, digital signal processing, image processing and wireless technology. These have been set up with support from Government agencies and industries. The Department has successfully completed a large number of sponsored research projects funded by various agencies. The number and scope of current projects funded by DIT, DST, MHRD, DOE, DRDO, PRL, Naval Research and Army Technology Boards, IBM and the likes bear testimony to the research potential of the Department.

Computer Science and Engineering

Computer Science education at IIT Roorkee made a modest start in early seventies with the introduction of two PG diploma course in computer hardware and software under the Department of Electronics and Communication Engineering. Very soon these diploma course were consolidated into a master of Engineering programme in 1975. This was a time when computer education was going through its initial phase in the country. Looking at the future potential of this discipline and the increasing manpower requirements for the industry and technology, the Department started a 4-year bachelor's programme in Computer Science and Technology in the year1983. An M.Tech. programme on Information Technology was also started in the year 2003.

As Computer Science education became a significant component in the Department, its name was appropriately changed to Department of Electronics and *Computer* Engineering in the year 1987. In 2001, when the University of Roorkee was declared the 7th IIT, the Department started an Integrated Dual Degree (IDD) programme leading to degrees of B.Tech.(CSE) and M.Tech.(Information Technology)besides the ongoing UG and PG programme in CSE. A review of the past initiatives and future course o f growth led, however, to the discontinuation of the M.Tech.(Information Technology) and the IDD programme in year 2012. The corresponding seats were added to the M.Tech.(Computer Science and Engineering) and B.Tech. (Computer Science and Engineering) programme respectively.

In January 2013, in order to create a better focus on the increasing Computer Science activities of the Department, a separate Department called the

Department of Computer Science and Engineering was carved out of the parent Department.
Following UG and PG programmes are being offered in the Department, besides Ph.D. programme.

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

The M.Tech. Programme offers a wide choice of elective courses so that students can specialize in their chosen field of specialization, like data mining, cloud computing, distributed systems, and network security.

A large number of M.Tech. and Ph.D. students are engaged in cutting edge research in the Department. This creates a very appropriate research atmosphere for M.Tech. students also. The Department has well equipped state of art laboratories for teaching and research. The high Performance Computing lab houses a 20 node SUN cluster besides other facilities. The Information Security Laboratory was set up with assistance from CISCO and Data Mining research laboratory has recently been set up with support from IBM. The Department is also in the process of establishing a Cloud Computing facility shortly.

The Department has experienced faculty who have successfully completed are working on a large number of sponsored research projects funded by DIT, DST, MHRD, DOE, DRDO,IBM, INTEL,RAILTEL etc.

Humanities & Social Sciences

Established in 1966, the Department of Humanities and Social Sciences endeavors to integrate human values and social concerns with technical education. Started primarily to teach English and Social Sciences to engineering students, it now possesses a vibrant and distinct identity, with teaching and research programs encompassing almost all the departments of the institute with its core, elective, and Pre-Ph.D., courses numbering thirty one. The Department undertakes teaching and research programs in the areas of English, Economics, Psychology, Philosophy, Sociology, IPR, Fine Arts and related interdisciplinary subjects. Till date, about seventy scholars have been awarded Ph.D. degree in different disciplines of the department, and thirty-four students are currently registered for this program. The Department also runs an evening course in German language. To facilitate and constantly upgrade teaching and research, the Department has Economic Data Base, Computer Lab, Psychology Lab and a state-of-the-art Language Laboratory with 60 booths. The faculty members have been engaged in sponsored research projects and consultancy. So far 8 major and 12 minor projects and 10 consultancy projects have been undertaken by the members of faculty, besides organizing training programs for teachers through QIP. Further, 405 research papers and book chapters, 25 books have also been published by the departmental faculty, whose erudition has been highlighted through a range of national and international recognitions.

Hydrology

The Department of Hydrology came into existence with the inception of International PG Course in Hydrology in 1972 with the assistance from UNESCO, Govt. of India and IDRC Canada. The course aims to impart training to engineers and scientists from Asia, Africa and other developing countries. The courses offered by the Department of Hydrology are presently sponsored by Government of India, UNESCO and WMO. So far, 808 participants including 302 foreign trainee officers from 38 countries have participated in the Post Graduate Programme. Since 2003, GATE qualified fresh engineering and science graduates from India have also been admitted in this programme. A candidate can opt for pursuing any of the three specializations viz. Surfacewater Hydrology, Groundwater Hydrology and Watershed Management. The department has excellent laboratories in the field of Hydrometeorology, Hydrological Information Systems, Water Quality, and Ground Water. The department has made significant contributions in the field of flood estimation, flood routing, watershed management and environmental hydrology; and handled more than 100 major research and consultancy projects in different fields of hydrology. Some important investigations include hydrological estimates on the failure of Macchu Dam II in Gujarat, design floods of 21 sub-basins of the Sone river, studies on ground water modeling and subsurface drainage studies in command areas of Sardar Sarover and Narmada Sagar projects respectively and water availability/ design flood estimations for various basins and hydropower projects of India including Tehri Dam.

Management Studies

The MBA programme was launched by the Institute to reflect the needs of present-day dynamic business and economic scenario and to enable its students to face the challenges of corporate world. The purpose behind this is to give the student a sustainable competitive advantage. It takes the onus to prepare a breed of managers who have the courage, skills and resilience to excel in the corporate world.

Mathematics

The Department of Mathematics attained its present status of an independent department in 1960. Growing steadily today the department not only teaches various topics in mathematics to undergraduate and post-graduate students of different engineering and science department, but also run its own 2 Years M.Sc. courses in Applied Mathematics and Industrial Mathematics and

Informatics and 5-Year Integrated M.Sc. Course in Applied Mathematics. Besides the central computing facilities of the Institute, the department has its own state of the art Computational Laboratory, a Mathematical Modeling Laboratory, Parallel Computing Lab, and Image Processing Lab. The department also offers the facilities for research work leading to Ph.D. degree in different branches of Pure and Applied Mathematics. The department has so far produced over 200 Ph.Ds. including some foreign students. Department has collaborations with different national and international organizations and has expertise in various fields of mathematics and others consultancies in mathematical modeling and solution of various industrial and real life problems. The faculty also joins different industrial research and consultancy teams to mutually solve problems of higher mathematical contents.

Mechanical & Industrial Engineering

The Department of Mechanical Engineering came into being in the year 1946 and the first batch of Mechanical Engineers graduated in the year 1949. In November 1973, the department was renamed as Department of Mechanical and Industrial Engineering. At present it offers both undergraduate and postgraduate teaching in various facets of Mechanical and Industrial Engineering. The department offers Master of Technology courses in Thermal Engineering, Machine Design Engineering, Production and Industrial System Engineering, Welding Engineering and CAD, CAM and Robotics. Besides doctorate level research facilities, the department has laboratory and workshop facilities with modern sophisticated equipment to carry out research in all areas related to Mechanical and Industrial Engineering. The faculty actively participates in sponsored research and consultancy work, conducts seminars/conferences and short term courses. The excellence of the department in Research and Development has been well recognized. The department has received funding from various agencies such as ISRO, DAE, DST, CSIR, etc.

Metallurgical & Materials Engineering

The department was set-up in the year 1963 when several new disciplines were started in the Institute primarily to train students at the undergraduate level. Postgraduate programs in Physical and Extractive Metallurgy were started in 1969 followed by the Industrial Metallurgy program in 1979. The Doctor of Philosophy program was initiated along with the Bachelors program. In its brief history of nearly fifty years, the department has distinguished itself by making significant contribution to teaching, research and industrial consultancy. In 1997 the name of the department was changed to Metallurgical and Materials Engineering to meet the challenges posed by emerging materials including rapid advancements in the field of engineering polymers, ceramics and composite materials. Recently, a thermo mechanical simulator was procured under the DST sponsored FIST program. It is the first such facility available in an academic institution in India. The department has several on-going research activities in the area of development of alloys, metal matrix composites, modeling and simulation, materials joining, surface engineering, tribology of materials and corrosion engineering. Several faculty members have international collaborations including exchange visits which have enhanced the research contribution of the department. In the last five years, the department has published more than 300 research papers and executed 30 and 35 research and consultancy projects, respectively, sponsored by various national and international agencies. A number of patents have been filed for innovative research in process and materials development and some of them are under active consideration for industrial licensing. A number of our alumni have received several prestigious national and international awards.

Physics

From a modest beginning in 1960, the Department has now grown into an active center of quality teaching and research. Today it stands as one of the leading departments in the country well known for its high quality teaching and research. Our programmes have special features, which are present only in a few institutions. The department offers M. Sc., M. Tech. (Solid State Electronics Materials) and Ph.D. programmes to the students. A five year integrated M.Sc. (Physics) programme has been started in the session 2007-08 with admission through JEE. Besides teaching the undergraduate engineering students, the faculty of the department provides active leadership in training the postgraduate students, which is evidenced by their performance in GATE and NET. In fact, up to 75% of the total strength of the students has been qualifying in GATE often holding a few top ranking positions. Our achievements in research have been well recognized by U.G.C. and DST in selecting our department under Special Assistance Programme many times since 1979 and FIST programme respectively. The U.P. Council of Science and Technology has also selected this department as a Centre of Excellence in Physics. The department has research activities in the areas of Atmospheric Physics, Atomic Physics, Condensed Matter Physics, Photonics, Nuclear Physics, Particle Physics and High Energy Physics. The department is successfully running various major and minor research projects funded by DRDO, DAE, DST, MIT and CSIR.

Paper Technology, Saharanpur Campus

The Department of Paper Technology at Saharanpur Campus is an industry oriented academic department of the Indian Institute of Technology, Roorkee. The Saharanpur Campus located about 50 km away from Roorkee, is a full-fledged campus with all the

academic and other infrastructural facilities. This department (erstwhile Institute of Paper Technology) started in 1964. It has been offering various academic programmes in Pulp & Paper at UG and PG levels.

Recently two new programmes were added to the ongoing programmes at the department. An Integrated M.Tech. (Polymer Science & Technology) was started in 2006, and an IDD B.Tech. (Process Engineering with MBA) was started in 2007. Presently, the Department of Paper Technology offers the following postgraduate programmes:

Two-year M. Tech. (Pulp & Paper)

Two-year M. Tech. (Packaging Technology)

In 2012, two new departments were carved out of the parent department, namely, Department of Polymer and Process Engineering and Department of Applied Sciences and Engineering. These departments offer Ph.D programmes in the area of Science, Humanities and Management.

The department has well developed laboratories in the area of pulp & paper, environmental engineering, biotechnology, and process instrumentation & control. Several state of art equipment/instrument like automatic dynamic sheet former, dynamic drainage analyser, laboratory coating machine, formation tester, fiber quality analyser, and a digitally controlled multi-purpose reactor have been added. Besides these, sophisticated analytical facilities like FE-SEM, XRD, AFM, FTIR, GC-MS, ICP, AOX, CHNS analyzer, and TOC are available at the Saharanpur Campus. The department was supported by DST under FIST during 2002-2007 and is supported currently for the period 2012-2017.

The department has multidisciplinary faculty engaged in teaching, research, and consultancy in the areas of Pulp & Paper, chemical recovery, environmental engineering, biotechnology, and wireless communication. Presently, about 70 students are pursuing their Ph.D. studies at the Saharanpur Campus.

Water Resources Development & Management

The department was established in 1955 as an Asian African Centre to impart training to in-service professionals in the field of water resources development and management. At present, the department offers application based Postgraduate Degree programmes in Water Resources Development and Irrigation Water Management for imparting training to in-service professional & fresh GATE qualified graduates in Civil, Electrical, Mechanical and Agricultural Engineering and Agricultural Sciences. A balanced blend of academicians and field engineers in the faculty with long experience in planning, design, construction, operation, and maintenance of water resources development and irrigation water management projects help in implementation of application oriented academic programmes. The department is actively involved in research, development and extension activities in the areas of water resources and irrigation management. The objective of the Department is to develop manpower that can take the responsibility of sustainable development and environment friendly management of the available water resources. The department has so far trained about 2579 in service engineers and agricultural scientists from 50 countries including India.

4 CENTRE OF EXCELLENCE

Centre of Excellence in Disaster Mitigation and Management

The Centre of Excellence in Disaster Mitigation & Management (CoEDMM) was established at Indian Institute of Technology Roorkee by the Ministry of Human Resource Development, Government of India in the year 2006, with a view to strengthening awareness, research and training in the frontier areas of research for Risk Reduction due to Natural and Manmade Hazards.

The demands of growing population have great pressure on the Natural Resources. This continues to over exploit the resources, causing catastrophe, mishap, calamity climatic changes arising from natural or man made causes and Industrial negligence or accidents. Consequent to this substantial loss of life, damage to the property and degradation of Environment takes place. To protect the environment degradation and preparing resilient and safe society, the Government of India through parliament has enacted Environment Protection Act in 1986 and Disaster Management Act 2005. These acts have notified the guidelines for Disaster Mitigation and Management and conservation of environment for sustainable development. The management of the above is a continuous and integrated process of planning, organizing, coordinating the efforts for capacity building towards resilient society and stable climatic conditions.

The Centre of Excellence in Disaster Mitigation & Management (CoEDMM) is aimed to focus on multidisciplinary research/training program involving faculty members from various departments from within and outside the Institute. The Centre of Excellence is a resource formed, to serve Governmental, Social organizations and Industrial groups from across the country. The Centre is setup to create technical manpower to undertake the social corporate responsibility, interact with industry, the government departments and create the required facilities to cater the needs of Multi-hazard Assessment and Risk Reduction.

Centre of Excellence in Nanotechnology

Centre for Nanotechnology was established in December 2005 as one of the Centres of Excellence. The faculty of the centre, drawn from different departments is involved in developing state-of-the-art facilities at the institute and is vigorously pursuing interdisciplinary research on various current aspects of Nanoscience and Nanotechnology. For this purpose the Institute has granted 40 MHRD assistantships to the centre. A wide range of sophisticated equipment related to nanotechnology has been made operational at IIC involving the multidisciplinary faculty of the centre.

In view of the major impact of 'Nanoscience' in vast disciplines of Science and Technology, M.Tech. programme on 'Nanotechnology had started in 2008. This course aims at providing the basic knowledge to B.Tech./M.Sc. students about various concepts of nanoscale materials, their synthesis, characterization, novel properties, applications and future perspectives. This being a multidisciplinary area, a number of electives have been designed to impart-knowledge on Nanoscale modeling and simulation, Nanophysics, Nanochemistry, Nanobiotechnology, Nanomedicine and technological aspects of Nanomaterials. Besides, it is providing students a practical training on advanced methods being employed for the synthesis, characterization and elucidation of different nanostructures. This expertise could be utilized to fabricate new Nanomaterials and Nanodevices for various applications.

Centre of Excellence in Transportation Systems

CTRANS is a Centre of Excellence of IIT Roorkee in the area of Transportation Systems with an aim to promote multidisciplinary and high quality research and education in Transportation Systems with collective participation of Engineers, Scientists and Researchers from Science & Technology, Humanities and Social Sciences, Architecture & Planning and Management Studies background. The Research and Education in multidisciplinary areas covers all modes of transport like Road Transport, Rail Transport, Air Transport, Inland Navigation & Water Transport & Pipe Line Transport. The research areas are Public Transport System, Airfield and Highway Pavement Management System, Intelligent Transport System, Design of Comfort (Rail Transport), Environmental Impact Assessment, Environmental Management, Biofuels for Automobiles, Air Quality Modeling, Mathematical Modelling, Supply Chain Management & Logistics, Electric Trolley System, Traction Technology, Remote Sensing, GPS & GIS Applications, Inland Water Transport, Polymer Applications in Transportation Systems, Accident Modelling and Road Safety, Urban Transportation Policy, Management of Transport Systems, Visual Communication Design System, Aesthetics, etc. The Centre is equipped with a number of modern equipments i.e., Road Measuring Data Acquisition System (ROMDAS), Portable Automatic Traffic Counter-cum-Classifier, Trimble IR 5600 Robotic Total Station, Electrodynamic Vibration System, Falcon Handheld Stationary Radar with Data Logger for Measurement of Vehicular Speeds, Integrating-averaging Noise Level Meter, 50" Plasma TV for Traffic Analysis study, Portable Falling Weight Deflectometer, Diamond Core Drilling System, Portable Reference Measurement System, Ground Pentration Radar (GPR) for Utility Detection and High Cell Density Bio-Reactor, Electronic Portable Static Wheel/Axle Weight Scale, Hand held Analyser with Sound Level meter for Aircraft Noise measurement The Centre has Sound Plan, HEADS, TRANSCAD VISUM & VISSIM softwares for a variety of transportation system problem analysis. The Centre has a good computing facility for modeling and simulation of transportation systems. A multi-Institutional Nationally Co-ordinated Project entitled "Integrated Development of Public Transport System" Sponsored by AICTE is currently being executed at this Centre. The DST, GOI has sanctioned a R&D Project on "Design and Analysis of Urban Multimodal Mass Transportation System" CTRANS is also offering Advice and Consultancy Services. The CTRANS is providing Consultancy Services to CPWD for Development of State Highways in Bihar State for a Consultancy amount of Rs. 5.6 crores. The completed part of this project found helpful for getting services quickly. A number of research scholars are pursuing Ph.D. on the identified multi-disciplinary research areas at CTRANS. Five research scholars have completed their Ph.D. programmes, during the year 2011-2012. A number of doctoral students are currently pursuing Ph.D. program at CTRANS. Recently one Post Doctoral Fellow has joined the Centre in the area of Soft Computing Technique Applications in Transportation Systems. The CTRANS has research collaboration with Queensland University of Technology (QUT) Brisbane, Australia.

5 ACADEMIC SERVICE CENTRE

Centre for Continuing Education

A pioneering centre in the area of continuing education, has completed more than 50 years of service. This centre acts as a window to disseminate information and technology on latest developments in the globe to face with rapid technological advancements. Courses are being organized through the technical expertise available in various departments of the Institute, experts are also invited from industries and R&D organizations to upgrade knowledge, to provide a platform for generating ideas, and for stimulating the current needs of the in service professionals. These courses are organized in consultancy as well as in sponsored mode to fulfill the clients' needs. The Centre has conducted about 250 courses/training programs during last three years

in various disciplines of management, engineering, science and technology to professionals from India and neighbouring countries.

The Centre is fully equipped with modern teaching aids, internet, wi-fi and an excellent boarding and lodging facilities.

Quality Improvement Programme Centre

The Quality Improvement Programme (QIP) Centre at the Institute, started in 1970-71, has been endeavoring to improve the quality of technical education in the country since its inception. It has been making efforts to upgrade the teaching curricula and enhance the knowledge of teachers of various engineering colleges/institutions. This is the only QIP Centre in India, which has been given the responsibility for undertaking activities related to the Technical Education.

ACTIVITES

- Providing opportunities for faculty members of AICTE recognized engineering Colleges/Institutions. This is the only QIP Centre in India, which has been given the responsibility for undertaking activities related to the Technical Education.

- Organizing Short Term Courses on the topics of recent interest by the faculty of IIT Roorkee alongwith experts from outside for serving faculty working in engineering Institute/Colleges.

- C.D. cell activities which include curriculum development (CD) as well as its revision, preparation of monographs and text books, laboratory manuals, undertaking of inter-institutional programmes, holding of seminars, workshops and panel discussions, developing educational technology, preparation of resource materials and undertaking of any other activity which helps to improve classroom teaching.

Institute Instrumentation Centre

The Institute Instrumentation Centre has a wide range of analytical facilities for processing and characterizing materials. These facilities are available for use by researchers (students/faculty) in both academia and industry not only for the academic community of IIT Roorkee, but also to various research organizations and industries across the nation.

IIC is equipped with more than twenty specialized and sophisticated equipments for analysis and solution of intricate scientific and industrial problems. These include, among others, Nuclear Magnetic Resonance (NMR), Thermal Ionization Mass Spectrometer (TIMS), Electron Probe Micro Analyzer (EPMA), Macromolecular Crystallographic Unit (MCU) for protein crystallography (All the required facilities for cloning to crystallization are available), X-Ray Fluorescence Spectrometer (WDS-XRF), Powder X-Ray Diffractometer (Powder-XRD), Glancing angle XRD, Single crystal XRD, Scanning Probe Microscope (SPM), Field Emission Scanning Electron Microscope (FE-SEM), 200 KV Transmission Electron Microscope (TEM), Scanning Electron Microscope (SEM), Superconducting Quantum Interference Device (SQUID) Magnetometer, Vibrating Sample Magnetometer (VSM), Atomic Absorption Spectrophotometer (AAS), Fluorescence Life Time System, Inductively Coupled Plasma Mass Spectrometer (ICP-MS) attached with Laser Ablation, Differential Thermal and Thermo Gravimetric Analyzer (DTA/TGA). Each laboratory generally has an operator working under the supervision of a faculty member or a scientific officer. Besides these, the Centre includes a training laboratory for summer training of the engineering students.

Institute Computer Centre

The Centre works towards the common goal of implementing the academic agenda of the Institute by constantly interacting, evaluating and updating the resources to meet the international standards. ICC is playing the major role of a central facilitator to students and faculty members who are intensely engaged in research activities. It is making available on appropriately high-end hardware platform, the latest scientific and engineering computing software to the research community.

Computing Resources:

• ICC, a central computing facility, is equipped for High Performance Computing, which includes infrastructure for Cluster Computing, besides high-end Servers and Workstations on heterogeneous platforms.

• Centre has a wide range of servers from Intel processor based ones to high-end RISC servers from HP, SUN, IBM, SGI and NAS (Network Attached Storage) servers of 2x1.6 TB (terabytes) capacity. Blade servers for computational requirement and software services at the central facility in hp c7000 blade system. SAN System with FC connectivity to blade system hp c7000.

• ICC has state-of-the-art facilities for applications such as: CAD/MCAD, Computational Fluid Dynamics (CFD), FEM & FEA, Image Processing / Scientific Visualization, 3DAnimation/Visual Simulation/ Geospatial imaging and analysis.

• It has mid-range to high-end configured graphics workstations with MIPS R16000 64 bit RISC based (SGI)/ 64 bit Quad-core Intel Xeon (Dual CPU) / 64 bit Quad Core Xeon (Dual CPU) / Core 2 Duo (Dual core) /PIV EM64T CPUs/AMD Opteron; GPU Optimized High Performance & Graphics Workstation (Supermicro 7046A-HR+) with NVIDIA Tesla for scientific/engineering computation and research in the area of GP GPU and HPC based applications.

• Linux based HPC Cluster and all the other servers can be accessed within the campus including DPT Saharanpur Campus through campus LAN.

Major Engineering and Scientific software resources:

ICC not only delivers the computing environment on 24x7 basis with remote access facility but has also established in a short span of time one of the best repositories of latest scientific and engineering computing software in any of the technical institutes in India. ICC's software licensing facilities provide the following major engineering and scientific softwares available throughout the campus over the LAN with network floating licenses:

- **ANSYS Academic Research v 14.0**
- **Autodesk Revit Architecture Suite 2009** & Educational Solution Set 2009
- **Abaqus 6.8.1**
- **ArcGIS 10**
- **Bentley** Suite of Products under Academic subscription with a set of 53 software along with *Microstation* software
- **ChemOffice** Ultra 10.0
- **ERDAS Imagine 2011** with LPS and Imagine Developers Toolkit and ER Mapper
- **Felix** for NMR
- **Hytran** 3.7.3-7
- **Intel Visual Fortran** 9.0
- **LabVIEW 2010**
- **MATLAB R2010b** with various tool boxes & Distributed Computing Engine
- **Mathematica** 5.0
- **Mechanical Autodesk Inventor** Series 11
- **MagNet** 64 bit v 6.22.1
- **NAG Libraries** and Compilers
- **Oracle** 9i & 10g
- **Pro/ENGINEER** Wildfire 4.0
- **SARscape** 4.2 with ENVI 4.7
- **SAP2000 v 15.0; ETABS Non-linear v 9.7.2 and SAFE v 12.3.1**
- **SPSS** 16.0
- **Solid Edge** 18.0
- **Adobe Acrobat 9.0 Prof**. (Academic Version)
- **MS Visual Studio.Net 2010**
- **Microsoft** software products under School and Campus Agreement.

Computing Environment and* Access *Timings:

• The Centre maintains a comfortable environment, conducive for research & training for both students and faculty.

• Dedicated systems with specialized software required by students of M.Tech, and Ph.D. scholars during their dissertation/thesis period in the Research Scholars lab at ICC. These are high- end workstations with multi-core with high processing speed and high capacity memory and graphics adaptors in network with remote access facility on 365x24x7 basis. Scientific and engineering software licenses being served through servers at ICC.

• Short term training programmes /workshop/seminar for students, faculty members and office staff are also being organized by the centre.

• It has eight job-specific labs with about 250 desktops/thin clients of latest configuration in 100/1000 mbps CAT 6 based structured network having gigabit managed switches with internet connectivity at every system.

• Computer Centre runs in two shifts from Monday to Friday from 8:00 AM to 11:00 PM and on Saturday and Sunday 8:45 AM to 11:00 PM.

• It is rendering services all 7 days/week. Computing and software license serving facilities are available on 24x7 basis within the campus including DPT Saharanpur.

Information Superhighway Centre

The Information Superhighway Centre(ISC) was established in March 1996. It is the nodal centre for outside/inside connectivity to the campus and serves as an Information Technology Center for promoting the effective use of IT, IT Systems, resource management and facilities for modernization/automation of the IP Infrastructure of the Campus

The Institute has a star topology Gigabit Ethernet Switch based, state-of-the-art Enterprise class network with data, voice and video communication capabilities. All departments, centres and Saharanpur campus are connected to the Information Superhighway through Optical Fiber. The network covers 365 acres of area through wired-line, Wireless access, and ADSL, providing internet/intranet, and e-mail facility to all faculty, students, staff, library, and laboratories.

Institute has 1 Gbps internet lease line link of National Knowledge Network (NKN) from NIC under MHRD Govt of India initiative. 100 Mbps internet leased line link from TATA Communication, New Delhi,100 Mbps internet leased line link from BSNL Haridwar, 2 Mbps Lease Line link from ERNET India, New Delhi, 34 Mbps dedicated leased line (RailTel) in a close group to Saharanpur Campus.

The ISC also has an Information Management Group(IMG) which is managed by B.Tech. students for developing website and intranet applications.

Mahatma Gandhi Central Library

The Mahatma Gandhi Central Library (MGCL) is one of the oldest academic & technical library of country equipped with latest ICT tools viz. RFID stations, wi-fi networks, surveillance cameras and Apple MAC PCs. It serves as a hub of the academic activities. The

Library excels in providing necessary information support to UG and PG students, research scholars and faculty members in the form of books, advanced treatises, reference works, monographs, current and back volumes of scientific journals to its users both as print and e-resources. The total print collection of the library has grown 3,86,000 volumes, which includes books, dissertations, theses, bound periodicals and other documents. Its e-resource collection includes 33000+ e-books, 2,00,000+ back volumes of journals, 15,000+ current e-journals published from major science and technology publishers for full access, besides 900 journals in engineering and physical sciences, bio-sciences, humanities and social sciences in print. The library also provides access to about 2,00,000 theses and dissertations through ProQuest Online database.

The library strives to provide physical facilities with calm and cozy atmosphere conducive to study for long hours like a separate reading room with 80 seating capacity where students are allowed to study with their own books. MGCL uses latest ICT in its functioning to provide 24x7x365 days academic supports to its members throughout the campus on Institute network for accessing available e-resources and consulting ONLINE catalogue of print collection. Whole library building provides wi-fi connectivity for mobile devices and applications. To enable the users to access the resources in more intelligent way, MGCL organizes short term training programmes/ workshops for its users. MGCL also facilitates for similarity checking of contents of master and doctoral thesis for plagiarism.

Attractions of the building are terrace garden, open spaces and provision of natural lights for more than three fourth area. This building is a rare blend of modern facilities and elegant architecture. It's fascinating podium with water cascade automatically attracts the attention of the passer-bys by its shear grandeur. The MG Central library is on its way to provide library services in such a way that **Saakaar** becomes **Niraakaar** and believes in being proactive rather than services on demand.

6. OTHER UNITS

Educational Technology Cell

Educational Technology Cell a part and parcel of IIT Roorkee is situated near the building of Centre for Continuing Education. This cell was primarily intended to produce high quality Video/web/multimedia based instructional material, Syllabus based content development for the National Programme for Technology Enhanced Learning (NPTEL) project, short courses/training programmes for faculty for development of video/web based course. Over the period of time its role has expanded to absorb new paradigms of e-learning, training of faculty to develop their own e-content and use of e-content developed by NPTEL, training of faculty about streaming of video & web based lectures in their respective institutes, streaming of round the clock video lectures on demand, at IIT Roorkee, creation of question banks, quality control of e-content generation through feedback mechanism, conduct of research related to pedagogies in e-learning, creation of innovative virtual experiments, support to “National Mission Challenges” undertaken by the Department of Higher Education, MHRD. The cell has state-of-art digital video camera, non-linear editing systems, audio and video systems, teaching aids, substantial number of computers, servers and softwares required to produce high quality Web based and Video based course. The cell has already produced 6 web based courses and 9 video based courses under NPTEL Project. These courses are accessible to anyone in India and abroad through the web site http://nptel.iitm.ac.in. This centre is also connected to satellite through EDUSAT (a facility provided by ISRO) to provided facility for the functioning of country-wide class room.

Intellectual Property Rights Cell

The intellectual Property Rights Cell of IIT Roorkee primarily functions to create awareness and to provide guidance to the academic and non-academic staff, students and research scholars on the practices and the rules and regulations of the institute regarding Intellectual Property Rights (IPRs) and obligations within the frame work of the IPR policy of the Institute. It works to safeguard the interest of inventors regarding IP with legal support which is necessary. During last eight years from January 2005 to January 2014 IPR Cell has processed 77 disclosures/ applications for patent filing and 30 of these have been filed. Two cases from the filed applications have been processed for technology transfer.

A Technopreneur Promotion Programme (TePP) outreach centre (TUC) has also been operating from the IPR Cell. This is a programme of DSIR to support innovative ideas towards commercialization since 2007. This centre has received 32 proposals for financial supports out of them 5 proposals have been considered for financial support from DSIR.

The IPR Cell also developed syllabus on education of IPR for the UG and PG students, which are successfully running in this institute.

The IPR Cell had organized several hand on training session for students, research scholars and faculty members in the past with the primary objective to brief them in (1) organizing the research work and innovation identification, (2) record keeping of the work (3) procedural aspect of patent search and (4) filing of disclosure for patent filing.

IPR Cell had also taken several initiatives in the past to meet the investigators and scholars of various ongoing research projects of every department/

centre of the institute to discuss about the state of the art and objective of their studies. This was in order to explore the possibility to organize their work towards creation of IP in which IPR Cell extends its relevant support appropriately.

Training & Placement Office

The Training & Placement Office the Indian Institute of Technology Roorkee, is committed to provide the best of placement opportunities to all the students (UG, PG and Ph.D.) graduating from this Institute. Under the Campus Recruitment Campaign, companies from all the sectors (i.e., Core, IT, Government, Academics, R&D and Financial) are invited for the training/internships and placement recruitment. Each student has to register with the placement office to avail this facility. Normally, the companies would deliver Pre- Placement Talks (PPTs) followed with Written Test/Group Discussions and Personal interviews. The Training and Placement Office of the institute is housed in a separate building with world class infrastructure to facilitate the recruitment process.

Every year, there is an increase in the number of companies visiting the campus. Approximately 200 new companies have been added in last three years. During academic year 2012-2013 (upto 24th January 2013) total 704 job offers have been received the highest and average annual salary package offered to the student with international offers are Rs. 65.00 lacs and Rs. 38.98 lacs and with domestic offers are Rs. 28.00 lacs respectively. The training and Placement Officel will continue to serve the student community.

7 SPECIALIZATIONS/ MAJOR RESEARCH AREAS

ARCHITECTURE AND PLANNING

Architecture

Architectural Design; Building Construction & Materials; Building Science; Landscape Design; Hill Architecture; Visual & Graphic Art; Urban Design; Architectural Conservation; History of Architecture; Interior Design; Architectural Education; Highrise Buildings; Energy Conservation & Passive Design; Sustainable/Green Architecture.

Planning (Urban & Rural)

Urban Planning; Hill Area Planning; Ecology; Sustainable Development / Planning; Integrated Rural Development; Energy Planning; Regional Planning; Housing; Urban Development Management; Environmental Planning.

ALTERNATE HYDRO ENERGY CENTRE

Alternate Hydro Energy Centre established in the year 1982 offers two M Tech Programmes in "Alternate Hydro Energy Systems" and "Environmental Management of Rivers and Lakes".
AHEC offers research in the area of small hydro power : Optimization of civil structures, hydraulic turbines, induction generators, power systems planning, distributed energy; solar energy, biomass energy, waste-to-energy, integrated renewable and hybrid energy systems.
The research areas in the field of environment are : water quality modelling, environmental management of rivers and lakes and GHG emissions from reservoirs.

BIOTECHNOLOGY

Biomolecular structure- conformation by nuclear magnetic resonance techniques; drug - DNA and protein - DNA interactions; Molecular Modeling; Protein crystallography; Microbial Transformations and Fermentation Processes; Microbial Production of Organic acids and Enzymes; Molecular Biology & Proteomics; Molecular cloning, characterization and expression of therapeutics proteins; Molecular Mechanism of Abiotic Stress Tolerance; Molecular Genetics of Nitrogen Fixation, Plant Biochemistry; Enzymology; Animal Physiology; Molecular Endocrinology; Reproductive Endocrinology, Bioassays for screening new drugs, Drug Designing; Molecular Pathogenesis; Environmental Biotechnology; Biochemical Engineering; Bioprocess Engineering; Downstream Processing; Enzyme Engineering; Chemical Biology; Drug discovery; Synthetic Biology; Aptamer technology; Small RNA; Chemical genetics; Microbial pathogenesis-molecular biology; cloning, expression and purification of molecular targets and studies of mechanism of action; Bioprocess modeling and simulation; bioreactor design; Bio-prospecting; Wheat and rice genomics and proteomics; germplasm enhancement.

CHEMICAL ENGINEERING

Advanced Transfer Processes; Computer Aided Process Plant Design; Environmental Pollution Abatement Engineering; Industrial Safety and Hazards Management; Process Integration; Applied Numerical Methods; Biochemical Engineering; Two Phase Heat Transfer; Process Intensification; Chemical Kinetics; Catalysis and Reactor Design; Computer Aided Design; Energy Engineering and Management; Fire Engineering; Industrial Pollution Abatement; Modelling and Simulation; Process Engineering; Process Control; Separation Process; Hydrocarbon Engineering;CFD; Polymer Science & Engineering; Supercritical Fluid Extraction; Membrane Separation.

CHEMISTRY

Analytical; Inorganic; Organic; Physical. Asymmetric synthesis; Bioanalytical chemistry; Bioinorganic chemistry; Chemical kinetics; Computer

simulation and molecular orbital calculations; Coordination chemistry; Development of low cost carbon alternatives for waste water management; Electroanalytical chemistry; Electrochemical sensors and chemical sensors; Electrochemistry; Enantiomeric resolution of pharmaceutically important compounds; Enantioselective catalysis; Epoxidation of olefinic compounds; Evolution and origin of life; Extraction chromatography; Heme proteins; Heterogeneous catalysis; Inorganic biochemistry; Ion beam analysis; Kinetics and nanomaterials; Liquid chromatography; Macrocycles; Main group chemistry; Metal speciation in environment; Metal-based drugs; Mossbauer spectroscopy; Neutron activation analysis; Organic electrochemistry; Organic electronics; Organic reaction mechanism; Organometallics (Ru, Si and Sn); Photochemistry; Protein sequencing; Size and shape effects of nanomaterials on their physico-chemical properties; Solvent extraction; Synthesis of heterocyclic compounds; Synthetic polymers/memberanes/ membrane electrodes; Syntheses of porphyrinoids for material applications; Solid state and materials chemistry; Statistical mechanics of polymers; Rational drug design; Multi component synthesis; Microwave assisted organic synthesis; Theoretical chemistry.

CIVIL ENGINEERING

Environmental Engineering

Emissions and air quality modeling, Air quality in megacities, Air Pollution and health impacts, Air Pollution control technologies, Energy and environmental policy, Climate change and sustainable development, carbon sequestration and storage technologies, Environmental impact and risk assessment, Planning, design, operation and optimization of water and wastewater treatment systems, Advanced water, wastewater and storm-water treatment, Environmental systems modeling and simulation, Bank filtration, Environmental remediation, Separation and speciation of contaminants, Environmental nanotechnology, Emerging pollutants, Environmental catalysis, Membrane processes, Hazardous and industrial waste management, solid waste management, High rate invessel compositing, Vermicompositing, Sludge treatment and disposal, Low cost rural technologies for waste management.

Geotechnical Engineering

Analysis and performance of shallow and deep foundations; Ground improvement techniques; Static and dynamic soil-structure interaction; Rock Mechanics and underground space technology (Tunnels/shafts/caverns) applied to hydropower/ strategic projects; Tunnelling in soft ground etc, Numerical Methods in Geomechanics, Geotechnical Earthquake Engineering.

Hydraulic Engineering

Clear water and sediment laden water flows in channels; Mathematical and Physical modelling of river processes; Water resources planning and management of Hydraulic structures Fluid dynamic drag and redeveloping boundary layer flows, Computational fluid dynamics Ground water flow and contaminant transport Modelling, Unsaturated Flow Modelling; Stochastic Hydrology; Hydraulic Transients; Dispersion phenomenon in river and atmospheric flows; Flood, Wind Engg, Hydro power, Irrigation and Drainage, Climate change.

Geomatics Engineering

Computer cartography; Surveying; GPS; Digital terrain modeling; Photogrammetry-close range, analytical and digital; Geodesy-geometrical, physical, mathematical and satellite; Remote Sensing- optical and microwave, SAR interferometry, Geographic Information System (GIS), Digital Image Processing.

Structural Engineering

Aero - dynamic studies of Building, Bridges and Towers; Behaviour and design of bridges; Computer aided design of multistoried buildings and bridges; Earthquake resistant design of buildings; Power house towers, chimneys and bridges; Fluid - structure interaction; Fibre reinforced concrete elements; Prestressed concrete elements and structures; Soil-structure interaction; Structural optimization; Post cracking behaviour of mason/ RC structures; Life assessment of structures; Structural composites. Response of Structure subject to accidental loading (Fire/Blast/Impact), Laminated Composites.

Transportation Engineering

Material characterization, reinforced flexible pavements, modified binders and mix design, composite pavements, pavement performance studies, pavement management systems, low cost pavements, rural roads, traffic flow modeling and simulation, highway capacity, environmental impact assessment, mass transportation analysis, transport planning, road traffic safety, ITS & GIS, non-motorized transportation, travel demand modelling, travel behaviour analysis, revealed & stated preference surveys.

COMPUTER SCIENCE AND ENGINEERING

Data mining, Web mining, Multi agent systems, Automated planning, Web services composition, theoretical computer science (automata, logic), Cloud computing and security, semantic web, software engineering, Mobile computing. Social Networks, Distributed computing.

EARTHQUAKE ENGINEERING

Earthquake Engineering Education in India started at the Indian Institute of Technology Roorkee (erstwhile University of Roorkee) in 1960, through the establishment of School of Research and Training in Earthquake Engineering. The School was renamed as Department of Earthquake Engineering and became an integral part of the University of Roorkee in 1979. Four major areas of earthquake engineering namely, Structural Dynamics, Soil Dynamics, Engineering Seismology and Seismotectonics, and Instrumentation have been nurtured for the past about fifty years. The major functions of the Department include teaching and research, and rendering expert advice to various organizations in the area of earthquake resistant design of structures and systems, such as dams, bridges, power plants, etc. The Department has played a key role at the national level in formulating Indian Standard Codes of Practice for earthquake resistant design of structures. Several major facilities exist in the Department for conducting experiments related to earthquake engineering. Some of the major facilities include: A low cost railway wagon Shock Table for dynamic testing of structural models up to 20 tonnes weight, a 3.5 m x 3.5 m computer controlled Shake Table with a maximum pay-load capacity of 20 tonnes to simulate Strong Ground Motion, a Quasi Static Testing Laboratory having servo-controlled dynamic actuator systems and servo-controlled compression testing machine of 300 tonnes capacity, a Soil Dynamics Laboratory equipped with liquefaction table, geotechnical centrifuge and cyclic triaxial testing system, and a Seismological Observatory having state of the art 3-component broadband seismograph to record local, regional and tele-seismic earthquakes. Department has deployed a Strong Motion Network of 300 digital accelerographs in the Himalayan region covering seismic zones V, IV and parts of zone III for the purpose of measuring strong ground motion in the event of major earthquakes and a state-of-the-art 12-station telemetered network deployed in the Garhwal Himalaya to continuously monitor the local earthquakes around Tehri Dam.

EARTH SCIENCES

Geology

Engineering Geology; Environmental Geology; Geochemistry, Petrology; Ore Geology; Petroleum Geology; Remote Sensing and GIS; Sedimentology; Statigraphy and Paleontology; Structural Geology; Geochronology; Economic Geology; Groundwater.

Geophysics

Engineering Geophysics; Exploration Geophysics; Geodynamics; Seismology; Solid Earth Geophysics, Mathematical Modeling and Inversion; Geoelectro-magnetism.

ELECTRICAL ENGINEERING

Improved Quality Multi-quadrant Solid State Converters; Multi level converters & Inverters; Switch Mode Power Supply (SMPS), High performance computer controlled DC & AC drives; Active Power Filters; Unified Power Quality Conditioner (UPQC); Intelligent condition monitoring of electric drives; Variable Speed Constant Frequency (VSCF) power generation; Multi-phase order drives; FPGA application to power, instrumentation and control.

Biomedical Instrumentation; Digital Signal and Image Processing; Industrial Instrumentation; Power System Instrumentation, Control and Protection; Process Instrumentation & Control; Medical Imaging & Signal Processing, Telemetry and Remote Control.

Power System optimization; Flexible AC transmission system; Wide area system monitoring, operation and control; Surge phenomena in power system engineering; Deregulation and Restructuring of power systems; Distribution system automation; HVDC transmission; Smart grid & Micro grid.

Computer controlled system; Modeling and model order reduction; Optimal System Operation; Robotics; Robust control, Intelligent control; FPGA Based Digital Design; Computer Vision.

ELECTRONICS AND COMMUNICATION ENGINEERING

Image Processing, Robotic control, Soft Computing using Fuzzy and NN, Control System, Meta-material inspired printed antennas & filters, High power millimeter sources and transmission components, Image Fusion/ processing, GPR, TWI, radar & optical remote sensing, CMOS RFICs, Antenna signal processing, Micro strip antennas, Radar signal processing, Target detection and estimation, Signal processing and communication systems, Nanoscale FINFET modeling, Device/circuit co-design, Low power issues, MOFET (NW) reliability, FINFET device physics and circuit design, circuit performance models, Graphene based interconnects, Organic thin film, Transistor modeling, Semiconductor device characterization and modeling.

HUMANITIES AND SOCIAL SCIENCES

Economics

Economics of Human Capital, Demography, Development Studies, Rural Development, Agricultural Economics, Economics of Irrigation and Water Resources, Labour Economics.

English

Modern English Literature, Feminist and Gender Studies, Cultural Theories, Diaspora Novel, Post

Colonial Studies, Critical Theories, Canadian Literature, American Literature, Indian Writing in English, Translation Studies, Linguistics, ELT, Technical and Professional Communication, African and Carribean Literature.

Psychology

Human Resources Management, Organizational Behaviour, Woman Studies, Neuropsychology, Cognitive Psychology.

Sociology

Social Gerontology, Industrial Sociology, Community Health.

Fine Arts

History of Art, Art and Architecture, Virual Art, Modern Art, Applied Art.

HYDROLOGY

Surface Water Hydrology

Water availability and design flood studies; Hydro-meteorological network design, Hydrological data analysis, Extreame value estimation, Stochastic modelling; Water resources planning and system studies; Reservoir operation studies; Hydrological investigations and planning.

Ground Water Hydrology

Ground water modelling and recharge estimation; Hydrogeological and geophysical studies.

Watershed Hydrology

Watershed modelling and management; Agricultural and urban drainage studies; Soil erosion assessment and management; Spatial decision support systems for watershed management, Drought studies.

Hydroinformatics: Decision support systems including web and GIS based systems; Remote sensing and GIS applications in hydrology.

Environmental Hydrology

Eco-friendly technologies for wastewater treatment; Environmental assessment of agro-urban watersheds; Vulnerability assessment of groundwater systems; Decision support systems for environmental management.

INSTITUTE INSTRUMENTATION CENTRE

Major research activities in the Centre are based on Experimental Condensed Matter Physics. There are several sponsored projects and research programs in the areas of Experimental Condensed Matter Physics: Magnetic Multilayes/Heterostructures, SiC based Spintronic Devices, Superhard coatings, Thin Film based Solar Cells, Hydrogen sensing materials and other Functional Nanomaterials.

This Centre provides modern facilities for advanced materials processing and characterization. The facilities include well established Nanoscience Lab, which consists of state of the art nanomaterials synthesis facilities (Sputtering and Pulse Laser Deposition Technique for Nano-materials Synthesis). These facilities have been developed from the sponsored research grants. So far 6 major research grants have been received from various funding agencies such as DST (Under Nanoscience program), DRDO, CSIR, DAE and CPRI Bangalore. These facilities are being heavily used by more than a dozen graduate and postgraduate students.

MANAGEMENT STUDIES

General Management, Financial Systems, e-Governance, Knowledge Economy Mathematics Finance, Physics of Complex System etc.

Corporate Finance, investment Finance, Financial Services, Financial Regulations and Compliance, Financial and Management Accounting, Project Management, General Management, Corporate Social Responsibility, Information Ethics, Business Environment, Foreign Investment.

HRM, OB, Knowledge Management, Entrepreneurship, Human Capital

HRM, Learning organizations, Creativity and innovation, Workplace spirituality, Talent management, Management of change, Quality Management, Women Entrepreneurship.

Human Resource Management, Organisational Behaviour Organisational Development, Leadership Studies, Emotional Intelligence, Cultural Studies, Society and Organizations, Educational Management, Stress Management, Workplace spirituality, Worklife balance

Competency management, Training Effectiveness and Design of Training Systems, Gender differences at work place, impact of developmental initiatives on employee learning and Organisational Learning. HR Analytics and Change management

Marketing, International Business, Supply Chain Management, Strategy, Ethical and Social Responsibilities of Business

Marketing, Rural Marketing, Business Opportunity Development, Market Development, e-Governance, PPP, Blue Ocean Strategy, Bottom of the Pyramid Strategy, Leadership, Marketing & Advertising, Capability Approach and Market Development,

Management education, Business Innovation at Rural Level
Emerging issues in Marketing Management,Rural and Agricultural Marketing, New Product Development, Industrial Research,Research in Advertising and Promotion, Emerging Issues in Consumer Needs, Consumer Behaviour

Supply Chain, Operations Management, Marketing Management,CSR,General Management with emphasis on Indian Value System

Operation Management, Operation Research, Supply Chain Management, Project Management, Marketing Research, Sixsigma

Supply Chain Management, Operations Management, Operations Research, Total Quality Management, Industrial Engineering, Data Mining, Econometrics, General Management, Non-traditional Optimization Techniques, Applied Economics

IP Management, innovation and entrepreneurship, design thinking and creativity, International dimension of IP.

MATHEMATICS

Numerical Analysis; Computational Fluid Dynamics; Approximation theory; Mathematical Modelling; Operations Research; Hydrodynamics; Elasticity; Software Engineering; Financial Mathematics; Statistics; Probabilistic Boolean Functions; Bio-mathematics; Fracture Mechanics; Heat transfer in fluids; Mechanics of Smart materials; Non- Newtonian fluids; Parallel computing; Robotics and control; Statistics; Tomography; Summability theory; Special functions; Vibrations of beams and plates; Image processing; Complex Analysis; Symbolic Computation; Cryptography; Numerical analysis; Bio Mechanics; Fuzzy Mathematics; Differential Equations; Coding Theory; Fourier Analysis.

MECHANICAL AND INDUSTRIAL ENGINEERING

Machine Design Engineering

Machine design; Computational mechanics; Computer aided design; Experimental stress analysis; Fracture mechanics; Noise control and vibrations; Robotics and control; Solid mechanics; Tribology; Rotor bearing dynamics; Vehicle dynamics; Machine diagnostics; Machine dynamics; Instrumentation & control; Mechanics of Composites; Biomechanics; MEMS/NEMS.

Production and Industrial Engineering Systems

Computer aided process planning; Computer aided manufacturing; Flexible manufacturing systems; Metal casting; Machine tools and metal cutting; Product design development and ergonomic evaluation; Unconventional machining process; Advanced manufacturing; Supply chain management; Quality and reliability engineering; Processing of composites; Surface Engineering.

Thermal Engineering

Experimental fluid mechanics; Micro & Nano Fluidics; Bio Fluidics; Fuel Cell Combustion and IC engines; Computational fluid dynamics; Energy systems; Heat transfer; Thermal Contact conductance; Refrigeration and air-conditioning; Solar energy; Turbo-machines; Design of Thermal Systems; Two-phase flow and heat transfer; Fire Dynamics.

Welding engineering

Arc stability analysis; Design of weld joints; Welding metallurgy; Fracture mechanics of weld joints; Weld surfacing; Thermal spraying.

METALLURGICAL AND MATERIALS ENGINEERING

Extractive Metallurgy; Industrial Metallurgy; Physical Metallurgy; Composites; Non-Metallic Materials; Tribology of Materials; Ceramics Development; Corrosion and Protection; Metal Casting Technology; Mineral Processing; Powder Metallurgy; Thermodynamics and Kinetics; Metallurgical Waste Utilization; Welding Metallurgy; Alloy Design and Development; Coatings.

PHYSICS

Atmospheric Physics; Atomic and Molecular Collision Physics; Condensed Matter Physics (Solid State Physics); Nuclear Physics; Fiber Optics; High Energy Physics

Atmospheric Physics

Airborne studies; Lightning spectrum studies; Measurement of the charge centre in clouds; Modeling of airglow emissions, auronal emissions and atmospheric chemistry; No production due to lightning; Application in geophysical exploration; Lightning sprites; Aerosols; Troposphere–isosphere interaction; cloud formation, pollution. Atmospheric airglow emissions, modeling of space weather events, atmospheric waves and tides, solar physics, mesospheric, and lower thermospheric dynamics and coupling processes.

Atomic and Molecular Collision Physics

Autoionization; Break up processes: (e,2e) and (e,3e); Electron-atom (ion) elastic and inelastic scattering; Electron correlation in atoms, molecules, solids; elastic and inelastic scattering of spin polarized/unpolarized electron with atoms (molecules); Electron – molecule collisions; Heavy particle collisions; Laser induced processes; Momentum space properties, Compton profile, Electric dipole moments of atoms and molecules,

plasma diagnostic, atomic and molecular clocks, atomic structure calculation, applications of atomic physics in astrophysics.

Condensed Matter Physics

Electronic properties of surfaces; Electronic and magnetic properties of heavy fermion systems; High-T_c superconductivity MgB_2 and Fe-based superconductor Itinerant magnetism and mixed valence systems; Equilibrium and non-equilibrium phenomena in molecular fluids and liquid crystals; quantum liquids, non-Abelian guage field and spin orbit coupling in quantum gases, Direct electrons in grapheme, Diluted magnetic semiconductor carbon nanotubes, magnetoresistive materials. Anharmonic and disorder effects in solids (semiconductors, superconductors and low dimensional systems). Strongly correlated electronic ,systems, frustrated magnetic systems, density functional theory calculations and phenomenological studies. Dynamical (Acoustical, Electrical and Optical and Microwave) properties of insulators, semiconductors, High temperature, superconductors and Low dimensional systems, Quantum Wells, Wires and Dots.

Semiconductor nanostructures; Spin glasses; Thermal and mechanical properties of solids and liquids; Electronic, Magnetic and Optical properties of intermetallic compounds and low dimensional systems; Polymer- Ferroelectric composites; Electrical properties of Polymer Devices, Piezo and Pyroelectric effects; Magnetic stability and crystallization behaviour of amorphous systems; Thin films, Semiconductor devices; Wetting and Adhesion studies in Metal – Ceramic systems; Surface modification of polymers by flow discharge under different ambient conditions and its impact on surface energy and wetting characteristics of polymers. Functional Electroceramics, smart materials, multiferroic, Chemical and environmental sensors, energy scavenging materials, Nanoelectro ceramics. Optical Properties of wide band gap semiconductors.

Photonics and Fiber Optics

Large mode area optical fibers and rectangular wave guides, Specialty optical fibers; fiber and wave guides, gratings, surface plasmon resonance, organic light emitting diodes, optical properties of wide band gap semiconductors, multilayer thin films and nano particles by pulse laser deposition.

High Energy Physics

String theory: String/M-theory; compactification geometries, large volume compactifications and their cosmological and phenomenological applications; Quark-Gluon Plasma.

Nuclear Physics

Symmetries and application of special groups of nuclei; High spin states and behaviour of nuclei at fast rotation; Study of complex band spectra in nuclei; Semi-classical methods in Nuclear Physics; Study of rare nuclear phenomena; Hot and rotating nuclei; Exotic nuclei; Large scale shell model; Relativistic mean field models; Proton emission; Giant resonances; GT-Transition strength; Double beta decay and neutrino less double beta decay; calculation of nuclear transition matrix .elements; nuclear isomers; High isospin states.

Direct nuclear reactions; Electromagnetic dissociation; Unified models of nuclear structure and reactions; Nuclear astrophysics; Compact stars; Indirect methods in nuclear astrophysics.

Nuclear instrumentation and design; Spectroscopy with multi detector arrays, Production of neutron deficient radio nuclides; nuclear reaction mechanisms and generations of reaction data in low and intermediate energy; Trace analysis

PULP & PAPER TECHNOLOGY (Saharanpur Campus)

Paper / Pulp / Chemical Engg. / Chemistry / Electronics and Communication

Pulp Processing; Non- wood fiber pulping; Secondary fiber pulping; Recycling; Paper Making; Paper Physics; Printing; Energy Management; Chemical Recovery; Environmental Science & Engineering; Microbial Corrosion; Modeling of Process systems; Wood chemistry, Pulp bleaching; waste water treatment, Biotechnology, Nanotechnology, Microbiology

Electronics and Communication

Electronics, Instrumentation and Communication, Computer Science and Engineering, IT

POLYMER AND PROCESS ENGINEERING (Saharanpur Campus)

Process/Chemical Engineering

Control systems, Modelling & Simulation, Tissue Engineering, Nanofiber, Biorefinery, Optimization, Biosensor, Biotechnology, Nanotechnology, Drug delivery, Environmental pollution control

Polymer Science and Technology

Polymeric Nano Materials, Polymer Blends, Molecular Composites, Polymer composites based on Natural fibers and high tech fibers, Aerospace Polymers, Polymeric packaging materials Polymeric materials for Electronics, Photonics Devices, Ferroelectric & Antiferroelectric Agricultural, Paper and Textile Applications, Liquid Crystalline polymer, Biopolymers, PEEK based Fuel Cell Membranes, Amorphous Polymers, Membrane separation, Drug delivery, Process optimization, Modelling and simulation,

Porous polymer membrane, Degradation, stability and recyclability of Polymer, Bipolymer membrane, Polymeric molecular simulation, polymer specialty coatings.

APPLIED SCIENCE AND ENGINEERING (Saharanpur Campus)

Chemistry/ Material Science/ Mathematics/ Physics/ Humanities/ Management

Chemistry

Inorganic and Materials Chemistry, Nanostructure and Nan materials, High Pressure and High Temperature (HPHT) behavior of Mesoporous and Mesostructured Materials, Nanoporous Materials, Carbon Dioxide Capture and Separation

Material Science

Nanomaterials, Material Degradation, Microbial Corrosion, Nanocomposite Coating, Electrochemical studies, Energy materials

Mathematics

Applied Mathematics; Different methods of Solutions to non-linear Partial differential equations; Functional, Fractional, Abstract differential equations; Similarity Solutions. Numerical optimization, Operations Research, Soft computing techniques particularly Genetic Algorithms, Swarm Intelligence (Artificial Bee Colony, Particle Swarm Optimization), Differential Evolution, Shock waves, Nonlinearity, Gas dynamics

Physics

Nanoscience, Fuel cells, nanomaterials for battery applications, Energy materials, Superconductivity in Iron and Cuprate systems, Theoretical Modelling of Electronic properties of nanomaterials like Graphene and nanoscopic Josephson Junction, Solid state properties of Nanostructured Materials, Mossbauer spectroscopy, Condense Matter physics

Humanities

English literature, and other allied subjects of Humanities

Management:

Management Banking, Capital Market, Financial Management, International Financial Management and General Management , Advanced Marketing Research and Consumer Behaviour Analysis, Operations and Supply Chain Management

WATER RESOURCES DEVELOPMENT AND MANAGEMENT

Surface and ground water hydrology, water resource system planning and management Hydraulic and Structural design of water resources structures; River engineering; Drainage engineering Geotechnical engineering.

Application of remote sensing and geographical information system (GIS) to water resources and hydro power planning and management.

Crop planning & water requirement, soil survey & land use planning, watershed development and management, natural resources management, soil conservation, Irrigation water management, environmental impact assessment of agricultural system, principle & practices of irrigation, soil-water-plant relationship, water quality, evaluation of irrigation projects, Remote Sensing application in agriculture, Decision Support System.

Construction Plant & Machinery, Hydroelectric Generating Equipment; Power System Planning & Economics.

8. Ph.D. PROGRAMMES

Keeping in view the long tradition of academic excellence, the following institutional goals have been laid for doctoral research:

* To develop deep and broad understanding of fundamentals and state of the art of knowledge in the chosen field through courses and self-study,
* To develop synergy between creativity, innovation and the frontiers of knowledge in the chosen field of study,
* To develop ability and skills to carry out independent research and development to face the challenges posed to mankind on specific problems, and
* To develop abilities to identify new possibilities in the given Indian social context and to undertake research and development through one's own initiatives.

The Degree of Doctor of philosophy is granted for research work in areas recognised by the Academic Departments of the Institute. The research work shall be an original work characterized either by the discovery of facts, or by a fresh approach towards the interpretation and application of facts, or development of equipment making a distinct advancement in instrument technology. It shall evince the candidate's capacity for critical examination and sound judgement and shall represent original contribution to the existing knowledge. The Institute is also recognised as one of the centres in the country for Ph.D. programmes under QIP.

Facilities for enrolling for the Ph.D. programme as a part time candidate are also available.

9. ADMISSION CATEGORIES

1. The applicant for admission to the Ph.D. programme shall be classified under any one of the following categories which will be decided and recommended by DRC/CRC.

(I) Full-time Research student/Candidate

a) Research student/Candidate getting Institute MHRD assistantship.
b) Research student/Candidate including foreign nationals getting financial support from Govt. / Semi Govt. agencies (QIP, CSIR, UGC, NET, DAE, DST, DBT, NBHM, ICCR, ICAR, ICMR, GPAT, NDF, INSPIRE etc.)
c) Research student/Candidate including foreign nationals supported by a sponsoring organization, the applicant (Sponsored Research Student/ Candidate) having TWO years experience out of which at least ONE year experience with the sponsoring agency at the time of registration for Ph.D Programme.
d) Self Financed Research student/ Candidate
—**Foreign:** Admission of Foreign nationals to Ph.D. programme will be made as per policy and direction of the Govt. of India from time to time
—**Study Leave**: This category refers to persons who are released from governmental or educational institutions on study leave for a period of not less than three years for pursuing Ph.D. programme. They will be admitted along with the regular research students through the usual admission procedure.
e) * Research student/candidate regularly working full time in an R & D project at IITR. His Ph.D. topic shall confirm to the project as certified by the SRC.

II) Part-time Research Student/ Candidate:

a) Research student/Candidate working as a regular employee in the Institute
b) * Research student / Candidate working regularly full-time in an R&D project in the institute. The project must have tenure of at least next 1½ years at the time of admission.
c) Research student/Candidate working in other organizations / institutes, approved by IIT Roorkee as Research Centre or having MoU for research purposes.

* The research student / candidate working in a project will be given full time status, provided his research for Ph.D. is related to the project as certified by the SRC. However, part time research student/candidate may be given full time status when the project tenure is completed.

10. ADMISSION ELIGIBILITY

1. An applicant belonging to the above admission categories in clause 9.1 should possess the following qualifications in appropriate areas to be eligible to apply for admission for the Ph.D. programme of the Institute.

a) Masters degree or equivalent in respective discipline with a minimum Cumulative Grade Point Average (CGPA) of 6.50 on a 10 point scale or equivalent as determined by the Institute wherever letter grades are awarded; or 60% marks in aggregate (of all the years/semesters) where marks are awarded, for the GENERAL (UR) category and qualified national level graduate entrance test: GATE/UGC-NET/CSIR-NET or equivalent or holding a national level fellowship. The condition for national level graduate admission test is not applicable to sponsored full-time and part-time research candidates.

OR

b) B.Tech. / B.Arch. degree or equivalent in respective discipline from CFTIs with excellent academic record (with a minimum CGPA of 7.00 on a 10 point scale or 75% marks) with GATE.

Graduates from the IITs getting a CGPA score of 8.00 or above (on scale of 10) would be entitled to the assistantship without having to appear in GATE.

OR

The candidates pursuing master's programs in Engineering or Architecture from IIT Roorkee having CGPA of at least 8.50 on a 10 point scale (after first year/ completing all courses) shall have a choice of internal lateral entry in to Ph.D. programme after completing all requirements of the first two semesters of first year of the Master's programme.

2. The admission eligibility requirements may be relaxed to 5.5 on a 10 point scale or equivalent, or to 55% marks to the following categories:
   a. SC/ST candidates with Master's degree or equivalent degree.
   b. Any category of PD (Persons with different abilities) candidate holding Master's degree or equivalent degree.

Note: Candidates belonging to OBC category must submit Xeroxed copy of category certificate as per GOI, the format of the same is also available on the Institute website, OBC Non-creamy layer

certificate should have been issued after 31.03.2015 by a competent authority.

3. **Eligibility for Part-time Ph.D.**

a) The applicant possesses the minimum entry qualifications for the degree as given in clause 10.

b) The applicant proves that his official duties permit him to devote sufficient time to research;

c) He / She will be required to reside at the Institute for a period till he/she is admitted for candidacy. (This condition of minimum residency period will be automatically waived for candidates who are working in Roorkee or in Organizations / Institutions located within a distance of 100 km from the Institute).

d) The facility of part time registration will also be available to all employees of the IIT Roorkee or candidates working in organizations having MoU with IITR or organizations approved by IIT Roorkee as Research Centres. Such applicants are exempted from the requirement of having GATE/NET/GPAT.

e) The applicants must have been in continuous service with the sponsoring organization for at least two years at the time of registration for admission.

f) The candidates working in Institute/ University awarding Ph.D degree itself are not eligible for admission as part-time or full-time candidate, if facilities are not available except QIP candidates.

4. Employee seeking admission to the Ph.D. programme with minimum of two years service in an organization or confirmed regular employee shall submit 'No Objection Certificate' from the employer to the effect that the duties allotted by the employer will allow the required time for this pursuit.

5. The candidate seeking admission to Ph.D. programme as project fellow (JRF/SRF) either as full-time or part-time research scholar, shall be allowed to register for Ph.D. in the beginning of the next semester, if the candidate is selected in project as project fellow through proper selection, i.e, proper advertisement of project fellowship and selection by the committee constituted as per Institute rules. The candidate shall register with the PI as supervisor.

If the candidate is not selected in project through proper advertisement or the candidate wants to switch over to MHRD assistance, he/she has to appear for Ph.D selection along with other candidates provided he/she has 'No-Objection Certificate' from the PI.

The project fellows shall be allowed to register for Ph.D. only if the remaining period of the project is at least 1½ years at the time of admission. These candidates are also eligible for MHRD assistantship for a maximum period of TWO years once their project is completed provided the essential qualifications for MHRD assistantships are met. The candidate has to apply for MHRD assistantship through SRC.

B. Department level shortlist/screening and selection:

1. The short listing of applications for the purpose of admission will be carried out by the DRC/CRC of the concerned department/centre.
2. The DRC/CRC of the concerned department/centre may set the short-listing criteria, if considered necessary, higher than the minimum eligibility criteria defined in clause 10.
3. The basic guidelines/instructions for short listing and selection are given below:

a) A merit list of all candidates shall be prepared on the basis of UG and PG marks only for short listing the candidates. The list shall include all PG candidates both from IITs and non-IITs. GATE, Inspire, ICAR, ICMR, GPAT or their equivalent shall be considered only as qualifying criteria.

b) Depending on the number of seats, the departments may decide cut-off marks and call the candidates as per institute policy. (i.e, if 'X' is the cut-off marks for GEN category, 0.90*X will be the cut-off for OBC category and (2/3)*X will be the cut-off for SC/ST/PD categories). The departments must ensure that sufficient numbers of candidates from reserved categories are called for admission.

c) All candidates holding bachelor's degree from CFTIs including IITs and NITs having CGPA

more than 7.00 on a 10 point scale shall be called, even if they have not done PG but qualified GATE.

d) All candidates holding bachelor's degree from IITs having CGPA more than 8.00 on a 10 point scale shall be called, even if they have not appeared in GATE.

e) All candidates holding master's degree from IITs having CGPA of 8.00 shall be called for interview/written test or both as applicable.

f) The final selection of candidates will be on the basis of either interview only or written test-shortlisted-interview as decided by the departments.

g) If the departments are selecting the candidates only on the basis of interview, department may put a higher cut-off criteria to restrict the number of candidates called for selection. However, all candidates as per point (c) to (e) must be called.

h) If the departments are conducting written test, the candidates are shortlisted on the basis of their performance in written test and only these shortlisted candidates are to be interviewed. The final selection of candidates will be done on the basis of performance both in written test and interview (40% written test + 60% interview).

However the criteria for final selection will be made by different departments are as under:

Department	**Selection Criteria**
Arch. & Plang.	**Only Interview**
AHEC	**Only Interview**
Biotechnology	Written Test –shortlist-interview
Chemical Engg.	**Only Interview**
Chemistry	Written Test –shortlist-interview
Civil Engg.	**Only Interview**
Earthquake Engg	**Only Interview**
Earth Sciences	**Only Interview**
Electrical Engg.	Written Test –shortlist-interview
E & C E	Written Test –shortlist-interview
Computer Science & Engg	Written Test –shortlist-interview
Hydrology	**Only Interview**
Humanities & Social Sciences	**Only Interview**
Mech.& Ind. Engg.	Written Test –shortlist-interview
Met. & Mat. Engg.	**Only Interview**
Paper Technology	**Only Interview**
Applied Science & Engg	**Only Interview**
Polymer and Process Engg	**Only Interview**
Institute Instrumentation Centre	**Only Interview**
Management Studies	**Only Interview**
Mathematics	Written Test –shortlist-interview
WRD&M	**Only Interview**
Physics	**Only Interview**
Nanotechnology	**Only Interview**
Disaster Mitigation	**Only Interview**
Transportation Systems	**Only Interview**

(4) **Eligibility for Foreign Nationals**

a) The applicant possesses the minimum entry qualifications for the degree as given in 10(1);

b) Foreign nationals seeking admission to Ph.D. programmes should apply through the Govt. of India, if they wish to come through any Govt. supported programmes or under Cultural Exchange Programmes, or through Educational Consultants (India) Ltd., New Delhi. They may seek necessary help from the Indian Embassy in their country or their Embassy in India. In addition to these avenues, a provision of direct admission for Non-Resident Indians (NRI's) and self-financing Foreign National candidates exists for Ph.D. degree programmes.

c) Foreign nationals are required to undergo medical examination as per medical rules of the Ministry of Human Resource Development, and have to undergo test for HIV at NICD, Delhi within one month of their admission. The admission of foreign nationals would be confirmed only after medical examination and the receipt of the test report regarding HIV.

d) Foreign nationals will be admitted only after obtaining the clearance from the Govt. of India. Foreign candidates having student's/provisional student's visa only are eligible for admission.

For NRI and Self Financing Foreign Nationals

Non-Resident Indian (NRI) nationals residing and studying abroad and self-financing, non-sponsored foreign nationals who are interested in obtaining admission are eligible for admission subject to medical and Government clearances.

Foreign candidates including NRI and Self Financing Foreign nationals must have fulfilled the following :

(i) Qualifications equivalent to educational qualifications required for admission to Ph.D. programmes as per section 10.

(ii) The candidates must have a minimum of two years of full-time work experience in a relevant field after the qualifying degree

(iii) Certificate of good conduct and character from the Head of Institution last attended,

(iv) Three reference letters.

(5) Application Process

For admission to Ph.D. programmes for Spring Semester of the session 2015-16 candidates need to register and fill the application from 26.08.2015 ONLINE only by accessing the website http://pgadm.iitr.ernet.in on or before Sept. 17, 2015. The application process is complete only when a print out of the filled ONLINE application with the candidate's signature, downloaded IITR copy of bank challan and a good quality photo affixed in the appropriate places is sent to the PG Admissions Office, IIT Roorkee, Roorkee - 247 667, Uttarakhand along with necessary documents on or before Sept. 22, 2015.

(6) HOW TO APPLY

Before applying, candidates are advised to read the Ph.D. Information Brochure (Spring Semester) 2015-16 carefully.
Candidates must follow the following Steps while applying online Application Form.

Step 1: Apply for Ph.D. programmes

a) Register

b) Login

c) Apply online.

d) Finalize Application Form

e) Download Application Form and Bank Challan simultaneously (Take a print out of the entire file on A4 size white sheets)

Step 2: Deposit of Fee

a) Deposit the requisite fee of Rs. 200/- for Gen/OBC and Rs. 100/- for SC/ST/PD category candidates in any branch of State Bank of India throughout the country through downloaded bank challan form **on the next working day of finalization of online application or on or before September 19, 2015. (Bank Service Charges of Rs. 40/- will be extra).**

Separate fee will be deposit for each department/centre.

b) Bank will retain a copy and will return two copies to you. Out of these two copies, retain the Candidate's copy with you and attach the IITR's copy with the application form.

Note: The fee will not be accepted through any other mode.

Step 3: Paste your recent photograph (3.5 cm X 3.5 cm) at the designated place.

Sign at the designated place.

Step 4: Post/Submission: Before sending your application form, make sure that, in addition to the above other relevant documents as indicated below are attached:

- IITR copy of challan
- GATE/NET Certificate
- Copies of all the marksheets, degree certificates, or provisional certificate if they have passed their qualifying degree.
- Copy of OBC/SC/ST/PD category certificate if any)
- **Copy of experience of two years as on Sept. 22, 2015 and NOC from the employer, in case the candidate is sponsored.**

Duly filled-in Application form with appropriate enclosures must be sent by Speed Post (preferably) or by Registered Post to The PG ADMISSION, PG ADMISSION OFFICE, INDIAN INSTITUTE OF TECHNOLOGY ROORKEE, ROORKEE-247667, UTTARAKHAND so as to reach on or before Sept. 22, 2015.

OR

It can be handed over personally to the PG ADMISSION Office, IIT Roorkee, Roorkee on or before Sept. 22, 2015 .

11. FEE STRUCTURE

The fee will be charged each semester as per Institute rules/ norms applicable from time to time. Details can be obtained from Assistant Registrar (Academic Research).

12. FINANCIAL ASSISTANCE

A good number of MHRD Assistantships/ Fellowships may be available as per regulation.

13. GENERAL INSTRUCTIONS

(i) Students shall be governed by ordinance/ regulations in vogue.

(ii) The Institute has the right to cancel, at any stage, the admission for the candidate who is found admitted to a course to which he/she is not entitled, being unqualified or ineligible in accordance with the statues and regulations in force.

(iii) Disputes if any, arising out of or relating to any matter whatsoever, concerning the aforesaid shall be subject to the exclusive jurisdiction of Roorkee Court.

14. Minimum Qualification for admission to Ph.D. Programme in Different Disciplines

1. Alternate Hydro Energy Centre

i. B.Tech./ M.Tech. or equivalent in Civil/ Electrical / Mechanical/ Industrial/ Chemical/ Environmental/ Agricultural/ Computer/ Electronics Engineering

ii. M.Sc. in disciplines consistent with research areas of the centre.

2. Architecture & Planning

Master's degree in Architecture in any of the specializations offered by recognized Institutions of Architecture/Master's degree in Building Science/Technology with a Bachelor's degree in Architecture/Master's degree in Planning in any of the specializations offered by the recognized Institutions of Planning with a Bachelor's degree in either Architecture or Planning (B.Planning) or Civil Engineering.

3. Department of Biotechnology

i. Master's degree in any disciplines of Science

ii. Bachelor's/ Master's degree in medical sciences, engineering, pharmacy, veterinary and related disciplines.

4. Department of Civil Engineering

i. B.Tech/M.Tech. or equivalent degree in Civil Engineering. Candidate having an M.Tech. Degree but not having a Bachelor's degree in Engineering must have studied Mathematics at the Bachelor's level.

ii. B.Tech./M.Tech. degree in any branch of Engineering may be considered for research areas consistent with the academic background and experience.

iii. M.Sc. Degree in any branch of Science or MCA (with mathematics at the Bachelor's level for both M.Sc. and MCA) may also be considered for research areas in Geomatics Engineering.

5. Department of Chemical Engineering

i. B.Tech./M.Tech. or equivalent degree in Chemical Engineering.

ii. B.Tech./M.Tech. or equivalent degree in any branch of Engineering/ Chemical Technology and interdisciplinary areas.

iii. M.Sc. in disciplines consistent with the research areas of the department.

6. Department of Chemistry

i. M.Sc. or equivalent degree in Chemistry/ Physics.

ii. M.Sc. in Bio-technology or M.Sc. in Biochemistry

7. Department of Computer Science and Engg

(i) M.E./M.Tech. in Information Technology/ Computer Science & Engg./ Software Engg. or equivalent.

(ii) B.E./ B.Tech. in Computer Sc. & Engg./ Information Technology or equivalent.

(iii) Candidate should mention the broad research areas (Communication Systems, Computer Science and Engineering, System Modelling and Control, RF & Microwave Engineering, Microelectronics and VLSI Design) for which he /she wants to apply on his/her application form.

8. Department of Electronics and Communication Engineering

(i) ME. / M.Tech. in Microelectronics/ VLSI / Microwaves / Communication Systems/ Control Systems/Instrumentation/Circuits & Systems or equivalent

(ii) B.E./ B.Tech. in Electronics & Communication/ Electrical Engg. Or equivalent.

(iii) M.Sc. in Physics/Instrumentation/Electronics.

9. Earthquake Engineering

i B.Tech. / M.Tech. or equivalent degree in Civil Engineering/ Earthquake Engineering / any branch of Engineering .

ii M.Sc./ M.Tech. in Geophysics/ Physics/ Mathematics/ Geology for research areas in Engineering Seismology and Seismotectonics.

10. Department of Earth Sciences

M.Sc / M.Sc.Tech / M.Tech. degree in Geology / Geophysics / Applied Geology / Applied Geophysics / Geological Technology / Geophysical Technology / Geosciences / Applied Geosciences / Petroleum Geology / Petroleum Geophysics.

11. *Department of Electrical Engineering*

i. B.Tech./M.Tech. or equivalent degree in Electrical Engineering.

ii. B.Tech./M.Tech. or equivalent degree in a branch of Engineering consistent with the research areas as mentioned by the Department from time to time.

iii. M.Sc. in a discipline consistent with the research areas as mentioned by the Department from time to time.

12. Department of Humanities and Social Sciences

i. M.A. or equivalent degree.
ii. Master's degree in Science/Graduate Degree in Engineering/ Technology with 60% marks (or equivalent grade) may be considered for research areas consistent with the academic background and special interests.

13. Hydrology

i. Master's degree in Civil Engg./ Water Resources Development/Hydrology.
ii. Master's degree in Agricultural Engg./ Environmental Engg./Instrumentation/water use management
iii. M.Sc./M.Tech. in Geology/Geophysics/Soil Science/Forestry or natural Resources/ Chemistry/ Meteorology/ Atmospheric Physics/ Mathematics/Nuclear Physics & Environmental Sciences
iv. M.Sc. Hydrology with Mathematics at Bachelor's level

14. Department of Management Studies

i. B.E./B.Tech. or equivalent, M.E./ M.Tech or equivalent qualifications.
ii. M.Sc./M.A./M.Com.
iii. Master of Management/M.B.A. or equivalent.

15. Department of Mathematics

i. M.A./M.Sc. in Applied Mathematics/ Statistics/ Computer Science / Mathematics / Ind. Mathematics
ii. M.Stat.
iii. M.C.A.

16. Department of Mechanical & Industrial Engg.

i. B.Tech./ M.Tech. degree or equivalent degree in Mechanical/ Industrial/ Production Engg.
ii. B.Tech./ M.Tech. degree in Aerospace/ Chemical/ Civil/ Electrical/ Metallurgical Engg. may be considered for research areas consistent with the academic background and special interests.

17. Department of Metallurgical and Materials Engineering

B.Tech/M.Tech or equivalent relate to the following disciplines:
Metallurgical Engg, Materials Engg, Nanotechnology, Engg Physics, Engg Chemistry, Ceramics, Polymers, Corrosion, Mechanical, Production & Industrial Engg., Chemical Engineering and Electrochemical Engg.

Or

1. M.Sc. degree in Physics, Chemistry, Materials Science.
2. Candidates with a M.Sc. degree, Mathematics as a subject at B.Sc. degree level is an essential requirement.

Note: Candidates having a degree I Industrial Engineering only, shall not be eligible for admission to the Doctor of Philosophy programme in the Department of Metallurgical and Material Engg.

18. Department of Physics

i. M.Sc. in Physics/ Applied Physics
ii. M.Sc. in Chemistry/ Mathematics/ Biophysics/ Geophysics/ Computer Science, provided Physics was a subject at B.Sc. level.
iii. B.Tech. or equivalent in Electrical/ Electronics/ Chemical/ Metallurgical/ Engineering Physics.
Candidates at Category (ii) and (iii) may be considered for research area consistent with the academic background and special interests.

19. Saharanpur Campus

a) Applied Science & Engineering

i. M.Sc. in Physics, Mathematics, Applied Mathematics, Statistics, Chemistry, Material Science, Nanomaterials, Nanoscience and Nanotechnology or its Equivalent Degree (with Mathematics as one subject at Bachelor's level).
ii. MA, M.Com., MBA, or its equivalent degree
iii. B.E./B.Tech/M.E./M.Tech. in Mechanical Engg., Material Science or its equivalent degree, Metallurgical Engg., Biotechnology, Nanotechnology, Solid State Technology, Chemical Engineering, Computer Science or its equivalent degree

b) Paper Technology

i. B.E./B.Tech/M.E./M.Tech. in Pulp & Paper Engg., Chemical Engg., Mechanical Engg., Environmental Engg., Electrical Engg., Electronics, Communication Engg., Computer Science & Engg., Instrumentation Engg., and VLSI Engg., IT, Biotechnology, Material Science or its equivalent degree.
ii. M.Sc. in Chemistry, Environmental Science, Biotechnology, Botany or its equivalent Degree (with Mathematics as one subject at Bachelors level)

c) Polymer and Process Engg

i. B.E./B.Tech/M.E./M.Tech. in Polymer, Chemical, Process Engg., Environmental Engg., Biotechnology, Nanotechnology, Computer Science or its equivalent degree
ii. M.Sc. in Chemistry, Medical Science or equivalent, Biotechnology, Physics, Mathematics, Microbiology or its equivalent Degree (with Mathematics as one subject at Bachelors level)

20. Water Resources Development & Management

i Water Resources Development

B.E./ B.Tech. /M.E./ M.Tech. or equivalent degree in Civil, Electrical, Mechanical & Agricultural Engineering.

ii Irrigation Water Management

Master's Degree in Agricultural Sciences/ Social Sciences/ Chemical Engineering/ Biological Sciences/ Environmental Sciences/ Engineering/ Natural Sciences with at least one paper of Mathematics at the graduate level.

ADMINISTRATIVE OFFICERS & HEADS OF DEPARTMENTS/ CENTRES

Administrative Officers	**Name**	**Telephone No.**
Director	Pradipta Banerji	285500, 272742
Dy. Director	Vinod Kumar	285221
Dean, Academics	Pramod Agarwal	285255
Associate Dean, Academic Research	Ramakrishna Peddinti	285438
Associate Dean, Academic Studies	Apurbba Kumar Sharma	285421

Head of the Departments/ Centres

Alternate Hydro Energy Centre	M. P. Sharma	285213
Architecture and Planning	Ila Gupta	285214
Biotechnology	Partha Roy	285216
Chemical Engineering	C. B. Majumder	285217
Chemistry	Anil Kumar	285218
Civil Engineering	P. K. Garg	285219
Computer Science & Engineering	Manoj Mishra	285235
Earthquake Engineering	M. L. Sharma	285228
Earth Sciences	D. C. Srivastava	285232
Electrical Engineering	S. P. Srivastava	285231
Electronics and Communication Engg.	M.V. Kartikeyan	285235
Humanities and Social Sciences	S. P. Singh	285234
Hydrology	D. S. Arya	285236
Institute Instrumentation Centre	Ramesh Chandra	285307
Management Studies	S. N. Rangnekar	285014
Mathematics	V. K. Katiyar	285249
Mechanical and Industrial Engg.	P. K. Jain	285242
Metallurgical and Materials Engg.	S. K. Nath	285606
Physics	Rajesh Srivastava	285248
Saharanpur Campus	Y. S. Negi	2714003
Water Resources Development and Management	Deepak Khare	285251

Centres of Excellence

Centre for Transportation Systems	B. R. Gurjar	285100
Centre for Nanotechnology	R. Jaganathan	285490
Centre for Disaster Mitigation & Management	B. K. Maheshwari	285401
Registrar	Prashant Garg	285311, 272430

Note: Hostel accommodation will be provided, if available.

For further details please contact:

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