

भारतीय प्रौद्योगिकी संस्थान रुड़की  
**Indian Institute of Technology Roorkee**  
**Ph.D. Admission for Spring Semester 2012-13**

**INFORMATION BROCHURE**

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**HOW TO APPLY**

The candidate is required to download Bank Challan Proforma from [pgadm.iitr.ernet.in](http://pgadm.iitr.ernet.in) and then 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 **from September 26, 2012 to October 26, 2012**. The Bank Challan will be printed in triplicate. It is only available on Institute website and pay the fees through it. Bank will retain a copy and will return two copies to you. In those two copies, retain the Candidate's copy with you and attach the IITR's copy with the print out of downloaded application form.

**Note:-**

- 1. The fee shall not be accepted through any other mode.**
2. Separate application be sent for separate departments/centres and for each department/centre separate fees shall be required with each completed application form.

**LAST DATE FOR DOWNLOADING THE FILLED APPLICATION FORMS AND DEPOSIT OF FEE IS OCTOBER 26, 2012**

**LAST DATE FOR RECEIPT OF COMPLETED APPLICATION FORM AT IIT ROORKEE IS NOVEMBER 02, 2012**

## 1. THE INSTITUTE

Indian Institute of Technology Roorkee is the latest member of the IIT family and 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 has now 22 academic departments/centres offering 11 undergraduate courses in engineering and architecture, 5 dual degree programmes and 6 Integrated Dual Degree courses in M.Sc./Engineering and over 51 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 390 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 4300 undergraduate students, 2130 postgraduates and Over 1086 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, Ranging 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 29° 52' N and Longitude 77° 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. CENTRAL FACILITIES

### EM<sup>2</sup>RC

The EM<sup>2</sup>RC provides valuable resource material for higher education and mass communication. The programme produced at the centre are televised under the UGC's Country Wide Classroom programmes. The Doordarshan National TV Network telecasts these programmes.

The centre undertakes research aspects of educational technology in relation to learning in diverse age groups for both urban and rural population, in various disciplines. It invites faculty from within the Institute, other Colleges, Universities and Institutions for the production of programmes and software transfer.

### 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.

This centre provides modern facilities for advanced materials processing and characterization. The facilities include well established Nanoscience which consists of state of the art nanomaterials synthesis facilities laboratory (Sputtering and Pulse Laser Deposition Technique for Nano-materials synthesis). More details are available on the website. 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.

#### **Area of Research:**

There are two faculty members each having several sponsored projects and research programmes in the areas of Magnetic Multilayers/Heterostructures, MEMS Devices, Thin Film Solar Cells, Functional Nanomaterials, Molecular Crystallography/Bioinformatics, and Geo Physics.

#### **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 department and Centres are connected to the Information Superhighway through Optical Fiber. The network covers 365 acres of area through 35 Km of OFC and 70 km of CAT6/E CAT 5 UTP, connecting all Departments/Centres, Hostels and Saharanpur Campus. The Intranet has 6000+ wired-line I/Os and 3200+ points through Wireless access, providing internet/intranet, and e-mail facility to all faculty, students, staff, library, and laboratories.

All research scholar Hostels have wired line internet connectivity in each room. Under Graduate/Graduate hostels have Cyber café equipped with 20 desktop for internet connectivity in addition to 802.11g Wi-Fi network Internet/Intranet connectivity in each room. New Hostels at IIT Roorkee main campus and Saharanpur campus have Wire-Line connectivity in each room.

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.

Above Facilities through the Centre is being used extensively by the faculty and the students for their educational and research needs and provides an avenue for the exchange of Information with other libraries and the centres of research and education.

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

### **Quality Improvement Programme Centre**

The Government of India has launched the Quality Improvement Programme in the 1970-71. One of the main objectives of the programme is to upgrade the expertise and capabilities of the faculty members of the degree level engineering colleges/ institutions of the country. Since 1994-95, the programme is being implemented and monitored by All India Council for Technical Education. In "Quality Improvement Programme" only sponsored teachers are eligible for admission to both Master's and Doctoral Degree Programmes, with the aim to enable them to acquire Master's/Doctoral degrees and imbibe in them a culture of research and better teaching capabilities by exposing them to the environment of a higher level institute.

The Programme was launched to improve the overall quality of technical education in the degree level engineering colleges/institutes. It was anticipated that placing the teachers on the campus of these institutes of excellence including 7 IIT's, and Indian Institute of Science, Bangalore, will expose them to an altogether different environment of sophisticated infrastructure and to improve the standard of technical education in their own institute.

### **Mahatma Gandhi Central Library**

The library serves as a central organ of the academic activities of the Institute. To this end, it continues to fulfill its obligations in providing necessary infrastructure facilities in the form of books, advanced treatises, works of reference and bibliographical nature, current and back volumes of journals, theses, CD-ROMS, e-journals, e-databases, e-books and other kinds of monographs to its members. It has well bound collection of more than 3.65 lakh volumes to meet the growing and varied requirements of its clientele consisting of undergraduate and postgraduate students, research scholars, faculty members. The library strives to provide physical facilities with calm and cozy atmosphere conducive to study for long hours. It subscribes to over 800 current journals in all branches of Engineering, Physical Sciences, Bio-Sciences and Humanities & Social Sciences. Besides this the library provides access to e-resources including more than 13,000 e-journals and 30,000 e-books published by major science and technology publishers of the world. All the e-resources of the library are available throughout the campus on Institute network. Library also maintains 5 LCDs, 7 servers and more than 100 Desktop PCs on its Local Area Network. Forty seven CCTV cameras have been recently installed at various places of the library. The Mahatma Gandhi Central Library has been provided with latest RFID technology with self issue/return facility for the users.

Mahatma Gandhi Central Library building is one of the

most beautiful buildings in the country. It is a state-of-the-art facility fully air-conditioned which provides the best possible environment to the students and faculty. It occupies an area of over 90,000 sq.ft. Ample sunlight through dome and skylight provision, state-of-the-art cabling for internet and light, fire services, cyber rooms, open terminal, wi-fi environment are some of the main features. A separate reading room with 80 seating capacity for using personal books is a unique feature. The Central Library is on its way to provide library services in such a way that Saakaar becomes Niraakaar and believe in becoming pro-active rather than providing services on demand.

### **CENTRES OF EXCELLENCE:**

#### **1. Centre for Transportation Systems(CTRANS)**

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 of the Centre, Architecture & Planning and Management background. The research areas are Public Transport System Highway & Airfield Pavement Management System, Intelligent Transport System, Design of Comfort (Rail Transport), Environmental Management, Biofuels for Automobiles, Traffic Emission Modelling, Air Quality Modeling, Mathematical Modelling, Supply Chain Management, Electric Trolley System, Traction Technology, Remote Sensing, GPS & GIS Applications, Health Hazard in Transportation System, Inland Navigation & Water Transport, Polymer Applications in Transportation Systems, Accident Modelling and Road Traffic Safety, Urban Transportation Policy, Management of Transport Systems, Environmental Impact Assessment, 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 and 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 etc. The Centre has Sound Plan, HEADS, TRANSCAD, VISSUM & VISIM softwares for a variety of transportation system problem analysis. The Centre has a good computing facility for modelling and simulation of transportation systems. A multi- Institutional Nationally Co-ordinated Project entitled "Integrated Development

of Public Transport System” Sponsored by AICTE is executed at this Centre. A R&D Project on “Design and Analysis of Urban Multimodal Mass Transportation System” sanctioned by DST, Govt. of India is under progress. CTRANS is also offering advice and Consultancy Services. The CTRANS is providing consultancy services for the RSVY Project of CPWD on “Development of State Highways in Bihar State”. The Ministry of Road Transport and Highways, Govt. of India has established Professorial Chair at CTRANS.

## **2. Centre for Disaster Mitigation and Management**

The Centre of Excellence in Disaster Mitigation & Management was established at IIT Roorkee in March 2006 to initiate multidisciplinary studies & national capacity building in Disaster Mitigation and Management. Initially, focus is on natural/man-made disasters. The Core faculty group and facilities are drawn from the participating departments.

The CENTRE is devoted to human resource development; R&D activities leading to Ph.D. degree; disseminates technical know how; provides extension services; evolves strategies for mitigation and management of disasters and establish a national database for rapid dissemination of information and knowledge. The centre is also engaged in running M.Tech. programmes in Disaster Mitigation and Management.

## **3. Centre for 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 seven 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. program 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.

## **4. SPECIALIZATIONS/MAJOR RESEARCH AREAS**

### **ARCHITECTURE AND PLANNING**

#### **Architecture**

Architectural Design; Computer Aided 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; Historical Conservation

#### **Planning (Urban & Rural)**

Urban Planning; Hill Area Planning; Ecology; Management Information System; Sustainable Development Planning; Hill 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, hydrolic 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/membranes/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**

Building Science and Technology; Computer Aided Design; Environmental Engineering; Geotechnical Engineering; Hydraulic Engineering; Geomatics Engineering; Structural Engineering; Transportation Engineering; Diversified areas of specializations - Bridge Engineering - Rock Mechanics - Traffic Engineering.

### **Building Science and Technology**

High rise buildings, Aerodynamic and seismic studies on buildings, Construction management and financing, Post peak response of P.C., R.C. and masonry structures to study overloading capacity, Concrete and composites, Health monitoring, residual life assessment and retrofitting of buildings, Risk analysis and optimization, Non flexural behavior of structural concrete, Impact and hygro-thermal behavior of structures, Application of soft computing techniques in building engineering.

### **Environmental Engineering**

Aerobic and Anaerobic Treatment Wastewaters; Design of air pollution control. Equipment; Design Planning, Operation and Optimization of Water and Wastewater Treatment Systems; Environmental Impact Assessment; Environmental Management; Hazardous Waste Management; Water Quality Modelling; Treatment and Disposal of Sludges and Solid Waste; Waste Disposal; Industrial Wastewater Treatment System.

### **Geotechnical Engineering**

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

### **Hydraulic Engineering**

Fundamental aspects of clear water and sediment-laden water flows in channels; Mathematical modelling of river processes; Optimization principles as applied to water resources problems; Rational design of hydraulic structures; Studies on fluid dynamic drag and redeveloping boundary layer flows; Ground Water Flow & Transport Modelling; Parameter Estimation; Unsaturated Flow Modelling; Stochastic Hydrology; Hydraulic Transients; Dispersion phenomenon in atmospheric flows and river flows; Flood forecasting.

## **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 microwaves, SAR interferometry, ANN – fuzzy theory, knowledge base, GIS, DSS.

## **Structural Engineering**

Aero - dynamic studies of Building, Bridges and Towers; Behaviour of ferrocement building elements; Computer aided design of multistoreyed buildings and bridges; Earthquake based resistant design of buildings; Power house towers, chimneys and bridges; Expert systems in structures, Fluid - structure interaction; Finite element analysis of structures, bridges, cooling towers; 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.

## **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.

## **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; Stratigraphy and Paleontology; Structural Geology; Geochronology; Economic Geology; Groundwater.

### **Geophysics**

Engineering Geophysics; Exploration Geophysics; Geodynamics; Seismology; Solid Earth Geophysics, Mathematical Modeling and Inversion; Geoelectromagnetism.

## **ELECTRICAL ENGINEERING**

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

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.

Automation of Power Plant; Power System Protection, Economic dispatch and planning; Flexible AC transmission system; Monitoring operation and control of power system; Surge phenomena in power system



engineering ; Deregulation and Restructuring of power systems; Distribution system automation; HVDC transmission.

Computer controlled system including process control; Modeling and model order reduction; Optimal System Operation; Robotics; Steady state and dynamic analysis of systems; FPGA Based Digital Design; System Reliability; Computer Vision, Human Computer Interactions; Pattern Recognition.

## **ELECTRONICS AND COMPUTER ENGINEERING**

Computer Science and Engineering: Wireless Networks, Automated planning, Distributed systems, Cloud Computing, Grid Computing, Mobile Computing, Security, Semantic Web, Web Services, Software Engineering, Multi-Agent Systems, Social Networks, Social graph mining and Cyber physical Systems

Electronics and Communication Engineering: Communication Systems, Signal / Image processing, Error Control Coding, Robotic vision / control, Millimeter wave sources, Microstrip Antennas and MICs, Microwave Imaging, Radar Remote Sensing, RF Integrated Circuits & Systems, Antenna Signal Processing, Low Power Design, Device modeling, Multigate MOSFETs, VLSI Interconnects, Carbon Nanotube based Design

## **HUMANITIES AND SOCIAL SCIENCES**

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

English - Modern English Literature, Diaspora Novel, Feminist Studies, Technical & Professional Communication, Critical Studies, Gender Studies, Post Colonial Literatures in English, Indian Writing in English, ELT and Linguistics.

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

Sociology - Social Gerontology, Industrial Sociology, Community Health.

Fine Arts - Mugal Art and Architecture, Modern Art, Applied Art.

## **HYDROLOGY**

**Surface Water Hydrology:** Water availability and design flood studies; Hydro-meteorological network design, Hydrological data analysis, Extreme 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.

## **MANAGEMENT STUDIES**

Financial Systems, Mathematical Finance, Physics of Complex Systems, Quantum Information Theory and Quantum Computing, Corporate Finance, Investment Finance, Foreign Investment, Financial Services, Financial Regulations and Compliance, Financial and Management Accounting.

Human Resource Management, Organizational Behaviour, Talent Management, Knowledge Management, Strategic Human Resource Management, Cross Cultural Management, Competency Management, Human Resource Analytics, Organizational Effectiveness.

Marketing Management, Rural Marketing, Customer Experience Management, Industrial Marketing, Bottom of the Pyramid Markets and Business Opportunity Development, Green Marketing.

Operations Management, Supply Chain Management, Project Management, Manufacturing Strategy, Quality Management

## **MATHEMATICS**

Approximation theory; Bio-mathematics; Fracture Mechanics; Heat transfer in fluids; Mathematical modelling; Magnetohydro-dynamic flows; Mechanics of Smart materials; Non-Newtonian fluids; Operations research; Parallel computing; Robotics and control; Statistics; Tomography; Summability theory; Special functions; Theory of relativity; Vibrations of beams and plates; Image processing; Complex Analysis; Computational Fluid Dynamics, 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; Tyre mechanics; Machine diagnostics; Machine dynamics; Instrumentation & control; Composites

**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; Materials and composites

**Thermal Engineering:** Fluid mechanics; Combustion and IC engines; Computational fluid dynamics; Energy systems; Heat transfer; Refrigeration and air-conditioning; Solar energy; Turbo-machines

**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 airflow emissions, auroral emissions and atmospheric chemistry; NO production due to lightning; Application in geophysical exploration; Lightning sprites; Aerosols; Troposphere–isosphere interaction; cloud formation, pollution.

#### **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

### **Condensed Matter Physics**

Electronic properties of surfaces; Electronic and magnetic properties of heavy fermion systems; High- $T_c$  superconductivity; Itinerant magnetism and mixed valence systems; Equilibrium and non-equilibrium phenomena in molecular fluids and liquid crystals; Diluted magnetic semiconductor carbon nanotubes, magnetoresistive materials. Anharmonic and disorder effects in solids (semiconductors, superconductors and low dimensional systems).

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, multiferrous, Nanoelectro ceramics. Optical Properties of wide band gap semiconductors.

### **Fiber Optics**

Specialty optical fibers; microstructured fibers; fiber amplifiers and lasers; large-mode-area fibers; fiber sensors; integrated-optic waveguides.

### **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 to 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; Shell Model; Relativistic mean field models; Proton emission; Giant resonances.

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.

## **PULP & PAPER TECHNOLOGY**

Pulp Processing; Non- wood fiber pulping; Secondary fiber pulping; Recycling; Paper Making; Paper Physics; Printing; Energy Management; Chemical Recovery; Environmental Science & Engineering; Corrosion Science & Engineering; Material Sciences; Pollution free bleaching; Modeling of Process systems; Applied Mathematics; Instrumentation and Control; Electrical Engineering; Mechanical Engineering and Production Engineering; Polymer Science and Technology.

## **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.

## **5. 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.

## **6. ADMISSIONS 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, DAE, DST, DBT, NBHM, JEST, ICCR, NDF, 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.
- d) Self Financed Research student/Candidate

—**Indian:** This category refers to persons with experience and with good track record to join the doctoral programme. They will be admitted along with the regular research students through the usual admission procedure.

—**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 is in confirmation to the project as certified by the SRC/ CRC.

### **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 2 years.**

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.

## 7. ADMISSIONS ELIGIBILITY

(1) An applicant belonging to the above admission categories in 6 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 in Engineering/ Technology/ Architecture/ Urban & Rural Planning / Pharmacy / Computer Applications of 3 years duration after graduation, in respective discipline or equivalent with a minimum Cumulative Grade Point Average (CGPA) of 6.00 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.

Such candidates should have qualified GATE prior to admission to M.Tech/M.Arch or thereafter (GATE score may or may not be valid) or UGC/ CSIR NET wherever applicable. This condition shall not be applicable to Sponsored Research Scholars/ Part-Time Research Scholars

**OR**

(b) Masters degree in Sciences/Humanities & Social Sciences/ Management in respective discipline or equivalent with a valid NET (CSIR/UGC)/NET (LS) or valid GATE or valid GPAT score and minimum Cumulative Grade Point Average (CGPA) of 6.00 on a 10 point scale or equivalent as determined by the Institute where letter grades are awarded; or 60% marks where marks are awarded.

**OR**

(c) B.Tech. / B.Arch. degree or equivalent in respective discipline with excellent academic record (with a minimum CGPA of 7.0 on a 10 point scale or equivalent or 70% marks) and in possession of a valid GATE score.

**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 31.03.2012 by a competent authority and duly attested by Gazetted Officer.

(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:

- SC/ST candidates with Master's degree.
- Any category of PD (Persons with disabilities) Candidate holding B.Tech. degree or equivalent degree.
- Academic staff of the Institute who has an experience of more than 5 years.
- Preference given to the candidates who possess M.Tech/M.Sc. degrees from IITs/IISc will be as follows:

Candidates with M.Tech. degree in Engineering or M.Arch. having a CGPA of 7.50 or more from IITs/IISc be called for interview and recommendations for their admission will be sent separately by the departments without taking into account their merit with candidates from other institutions.

Candidates with M.Sc./M.Tech. degree in Sciences having a CGPA of 8.00 or more from IITs/IISc be called for interview and recommendations for their admission will be sent separately by the departments without taking into account their merit with other candidates.

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

- The applicant possesses the minimum entry qualifications for the degree as given in 7(1);
- The applicant proves that his official duties permit him to devote sufficient time to research;
- He / She will be required to reside at the Institute for a period of not less than 6 months during his/her registration for the degree. (This condition of minimum residence 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).
- 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 valid GATE/NET/GPAT.
- The applicants must have been in continuous service with the sponsoring organization **for at**

**least two years at the time of submitting the application form for admission.**

- f) The candidates working in Institute/University awarding Ph.D. degree itself are not eligible for admission as part-time candidate.
- (4) Employee seeking admission to the Ph.D. programme with minimum of two years service in an organization or confirmed regular employee may obtain and 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.

## 8 Application Process

For admission to Ph.D programmes for Spring Semester of the session 2012-13 candidates need to register and fill the application form from 26.09 2012 ONLINE only by accessing the website <http://pgadm.iitr.ernet.in>. on or before October 26, 2012. 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 Chairman, PG Admissions Office, IIT Roorkee, Roorkee -247 667, Uttarakhand along with necessary documents on or before November 02, 2012.

## 9 HOW TO APPLY

**Before applying, candidates are advised to read the Ph.D. Information Brochure (Spring Semester) 2012-13 carefully.**

**Candidates must follow the following Steps while applying online Application Form.**

### Step 1: Apply Online

- Register
- Login
- Apply for Ph.D.
- Finalize Application Form
- 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

- 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 **on or before the last date i.e. October 26, 2012. (Bank Service Charges of Rs. 25/- will be extra) on downloaded bank challan form alongwith completed application form.**

**Separate fee will be deposit for each department/centre.**

- 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 October 26, 2012 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 CHAIRMAN, PG ADMISSION-2013, PG ADMISSION OFFICE, INDIAN INSTITUTE OF TECHNOLOGY ROORKEE, ROORKEE-247667, UTTARAKHAND so as to reach on or before November 02, 2012

**OR**

It can be handed over personally to the PG ADMISSION Office, IIT Roorkee, Roorkee on or before November 02, 2012.

## 10. 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).

## 9. FINANCIAL ASSISTANCE

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

## 10. GENERAL INSTRUCTIONS

- Students shall be governed by ordinance/ regulations in vogue.
- 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 statutes 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.

#### **11. Minimum Qualification for admission to Ph.D. Programme in Different Disciplines**

##### **1. Architecture & Planning**

Master's degree in Architecture/ Planning or its equivalent viz. P.G. Diploma in Planning awarded by CEPT/ SPA or Diploma in TCPI awarded by ITP (India).

##### **2. 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.

##### **3. 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 Bachelors 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 Bachelors level for both M.Sc. and MCA) may also be considered for research areas in Geomatics Engineering.

##### **4. 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.

##### **5. Department of Chemistry**

- i. M.Sc. or equivalent degree in Chemistry/Physics.
- ii. M.Sc. in Bio-technology or M.Sc. in Biochemistry

##### **6. Department of Electronics and Computer**

##### **Engineering**

- (A) For admission to Microelectronics and VLSI/RF & Microwave / Communication Systems / System Modeling and Control specializations.

- (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.

- (B) For admission to Computer Science & Engineering specialization.

- (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.

##### **7. 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.

##### **8. 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.

##### **9. 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.

**10. 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.

**11. 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

**12. 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.

**13. Department of Mathematics**

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

**14. 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.

**15. Department of Metallurgical and Materials Engineering**

- i. B.Tech./M.Tech. in Ceramic, Chemical, Electrical, Electronics, Electrochemical,

Mechanical, Metallurgical, Materials Engineering, Engineering Physics or an M.Sc. degree in Chemistry/ Materials Science, Physics are eligible for admission. For those with M.Sc. degree, Mathematics as a subject at B.Sc. degree level is an essential requirement.

- ii. The candidates are eligible for research in areas consistent with their academic background and special interests.

**16. 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.

**17. Department of Paper Technology**

- i. B.Tech. /M.Tech. or equivalent degree in Pulp & Paper, Chemical, Mechanical, Electrical, Electronics, Computer, Instrumentation, Metallurgical, Environmental Engineering.
- ii. M.Sc. or equivalent degree in Physics, Chemistry, Mathematics, Applied Mathematics, Industrial Mathematics, Bio-Science, Bio-Technology, Environmental Science and Material Science.

**18. 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.

**19. 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.

## ADMINISTRATIVE OFFICERS & HEADS OF DEPARTMENTS/ CENTRES

### Administrative Officers

	<b>Name</b>	<b>Telephone No.</b>
Director	Pradipta Banerji	285500, 272742
Dy. Director	Harsh Sinvhal	285221
Dean, Academic Research	Surendra Kumar	285255
Dean, Academic Studies	Ashwani Kumar	285087

### Head of the Departments/ Centres

Alternate Hydro Energy Centre	R. P. Saini	285213
Architecture and Planning	Pushplata	285214
Biotechnology	Ramasre Prasad	285216
Chemical Engineering	V. K. Agarwal	285217
Chemistry	V. K. Gupta	285218
Civil Engineering	A.K. Jain	285219
Earthquake Engineering	H R Wasan	285228
Earth Sciences	A. K. Saraf	285232
Electrical Engineering	Pramod Agarwal	285231
Electronics and Computer Engg.	Padam Kumar	285235
Humanities and Social Sciences	Rashmi Gaur	285234
Hydrology	M. Perumal	285236
Institute Instrumentation Centre	Ramesh Chandra	285307
Management Studies	S. N. Rangnekar	285014
Mathematics	R. C. Mittal	285249
Mechanical and Industrial Engg.	S.C. Sharma	285242
Metallurgical and Materials Engg.	P.K. Ghosh	285606
Physics	A K Jain	285248
Pulp and Paper Technology (Saharanpur Campus)	Satish Kumar	2727354
Water Resources Development and Management	Nayan Sharma	285251

### Centres of Excellence

Centre for Transportation Systems	M. Parida	285100
Centre for Nanotechnology	S. K. Nath	285490
Centre for Disaster Mitigation and Management	Ajay Gairola	285401
Registrar	Lt. Col. A.K. Srivastava (Retd.)	285311, 272430

*For further details please contact*



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