

# भारतीय प्रौद्योगिकी संस्थान रुड़की

## Indian Institute of Technology Roorkee

Ph.D. Admission and Post-Doctoral Fellowship

INFORMATION BROCHURE

### CONTENTS

#### Ph.D. PROGRAMME

1. The Institute
2. About Roorkee Town
3. Central Facilities and Centres for Excellence
4. Specializations/Major Research Areas
5. Ph.D. Programmes
6. Admission Eligibility
7. Reservation/ Relaxation
8. Eligibility for the Candidacy for the Degree
9. Fee Structures
10. Financial Assistance
11. General Instructions
12. Eligibility for Admission in different Disciplines

#### POST-DOCTORAL FELLOWSHIP

13. Guidelines for Award of Post-Doctoral Fellowship

*NOTE:- Completed Application Form alongwith the Bank Draft of Rs. 200/- in favour of CHAIRMAN, PG ADMISSION, IIT ROORKEE, payable at ROORKEE be sent to the Office of CHAIRMAN, PG ADMISSION, IIT Roorkee.*

**LAST DATE FOR RECEIPT OF COMPLETED APPLICATION FORM  
IS OCTOBER 30, 2009**

## 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 & Noida

IIT Roorkee has a highly qualified and motivated faculty of about 380 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 2250 undergraduate students, 1400 postgraduates and nearly 750 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 Central Library having more than 3.20 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 University, other Colleges, Universities and Institutions for the production of programmes and software transfer.

### Institute Instrumentation Centre

The Institute Instrumentation Centre is the shared analytical facility for the academic community of IIT Roorkee. Ever since its inception in 1978 as the University Science Instrumentation Centre of the

erstwhile University of Roorkee, it has provided excellent facilities of sophisticated analytical instruments to the students and researchers of not only IIT, Roorkee but also to the users of other organizations of the country. The centre is currently running two national facilities for, (i) Isotope Geology and Geochronology and (ii) Electron Probe Micro Analyzer. Besides these, it is equipped with more than fifteen specialized and sophisticated equipment for analysis and solution of intricate scientific and industrial problems. These include, among others, Nuclear Magnetic Resonance, Thermal Ionization Mass Spectrometer, Electron Probe Micro Analyzer, Macromolecular Crystallographic Unit (to be installed shortly), Powder X-Ray Diffractometer, Single Crystal X-Ray Diffractometer, Field Emission Scanning Electron Microscope, 200 KV Transmission Electron Microscope, Atomic Force Microscope, Scanning Electron Microscope, Superconducting Quantum Interference Device, Vibrating Sample Magnetometer, Atomic Absorption Spectrophotometer, Fluorescence Life Time System, Inductively Coupled Plasma Mass Spectrometer, Laser Ablation Micro Analyzer, Differential Thermal and Thermal Gravimetric Analyzer, Sputtering and Pulse Laser Deposition Facility for Nano-material studies. Besides these, the Centre includes a training laboratory for summer training of the engineering students. There are three faculty members each having several sponsored projects and research programmes in the areas of Earth Sciences and Nano-material sciences. Each laboratory generally has an operator working under the supervision of a faculty member or a scientific officer.

### **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.

**Computing Resources:** ICC, a central computing facility, is equipped for High Performance Computing, which includes infrastructure for Cluster Computing and Grid Computing, besides high-end Servers and Workstations on heterogeneous platforms. Centre has a range wide range of servers from Intel processor based ones to high-end RISC servers from SUN, IBM, SGI and NAS (Network Attached Storage) servers of 2x1.6 TB (terabytes) capacity. 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) with 4 GB 667 quad-channel DDR2 fully buffered DIMM memory and 768MB VRAM / AMD Opteron /Xeon EM64T with 2 GB RAM /PIV EM64T CPUs. 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's software licensing facilities provide the following major engineering and scientific softwares available throughout the campus over LAN with network floating licenses: MATLAB 7.7 R2008b with various Tool Boxes; ArcGIS 9.3; ERDAS Imagine 9.2 with Leica Photogrammetry Suite and Imagine Developer's Toolkit; SPSS 16.0; Mathematica 5.0; NAG Libraries and Compilers; Intel Visual Fortran; Felix for Nuclear Magnetic Resonance (NMR) spectral data off-line processing; Pro/ENGINEER Wildfire 4.0; Solid Edge 18.0; Mechanical Autodesk Inventor Series 11; Maya 5.0; ChemOffice Ultra 10.0; MagNet 64 bit v 6.22.1; Abaqus/Standard & Abaqus/CAE 6.8; STAR-CD for Computational Fluid Dynamics; SAP2000 v 11 for structural analysis and design of 3D structures & ETABS v 9 for analysis, design and drafting of building systems; Bentley suite of products under academic subscription; AutoCAD Revit Architecture Suite 2009 & Educational Solution Set 2009 (Architecture); NI LabVIEW academic site license with Campus Teaching; Oracle 9i & 10g and MS Visual Studio.Net 2005. Centre is also having 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. It provides dedicated systems with specialized software required by students of M.Tech and Ph.D scholars during their dissertation/thesis period. Short term training programmes 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 65 km of CAT6/E CAT 5 UTP, connecting all Departments/Centres, Hostels and Saharanpur Campus. The Intranet has 2700+ wired-line I/Os and 3000+ points through Wireless access, providing internet/intranet, and e-mail facility to all faculty, students, staff, library, and laboratories. Institute has 50 Mbps internet leased line link from TATA Communication, New Delhi, 50 Mbps internet leased line link from BSNL Hardwar and 1 Mbps SCPC VSAT based link from ERNET India, New Delhi. All research scholar Hostels have wired line internet connectivity in each room. All Under Graduate/Graduate hostels have 802.11g based Wi-Fi network providing wireless internet connectivity, besides that hostels are also provided with Cyber cafe equipped with 20 desktop for internet connectivity. Residences of faculty and other staff in the campus has been provided with ADSL and Dial-In Internet connectivity.

Above Facilities through the Centre are 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 Quality Improvement Programme (QIP) formulated by the MHRD was initiated at the Institute in 1971 for improving the standard of technical education and for enhancing the academic competence of faculty members of various engineering colleges in the country. Major activities include Faculty Development, Resource Development, Institutional Development, Education Research and Continuing Education. The QIP Centre also prepares teaching aid material to help the teachers of engineering institutions. Teachers are also provided with an opportunity to undertake ME and Ph.D. Programmes. The scheme is open to sponsored faculty members of various Engineering Colleges.

### **Central Library**

The Library serves as a central organ of the academic activities of the Institute. To this end it continues to fulfill its obligation 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-books and other kinds of monographs to its members. It has well bound

collection of more than 3.29 lakh volumes to meet the growing and varied requirements of its clientele consisting of undergraduate and postgraduate students, research scholars and faculty members. The library strives to provide physical facilities with calm and cozy atmosphere conducive to study for long hours. It subscribes to over 900 current journals in all branches of Engineering, Physical Sciences, Bio-sciences and Humanities and Social Sciences. Besides this the library provides access to E-resources including more than 10,000 e-journals and 11,000 e-books published by major Science and Technology publishers of the World. All the e-resources of library are available throughout the campus on Institute network. Library also maintains 5 servers and more than 100 Desktop PCs on its Local Area Network.

Central Library building is one of the most beautiful buildings in the country. It is the 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. A small cafeteria, ample sunlight through dome and skylight provision, state-of-the-art cabling for Internet and light, fire services, cyber rooms, open terminals, Wi-Fi environment are some of the main features. A separate reading room opened round the clock 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 providing proactive rather than services on demand.

## **CENTRES FOR 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 Water Transport, Polymer Applications in Transportation Systems, Accident Modelling and Road 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-Classifer, Trimble IR 5600 Robotic Total Station, Electrodynamical 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 softwares for a variety of transportation system problems 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 currently being executed at this Centre. The DST, GOI sanctioned considered a R&D Project on "Design and Analysis of Urban Multimodal Mass Transportation System" CTRANS is also offering advice and Consultancy Services. It has been engaged as a Third Party for Quality Control of State Highways constructed under RSVY project in the State of Bihar. A number of research scholars are pursuing Ph.D. on the identified research areas at CTRANS. One of the research scholars has been awarded National Doctoral Fellowship by AICTE.

The Ministry of Shipping, Road Transport and Highways, Govt. of India and Housing and Urban Development Corporation (HUDCO), New Delhi have established Professorial Chairs at CTRANS in the area of "Development of Highway System in the Country" and "Urban Transport Infrastructure" respectively.

## **2. Centre for Disaster Mitigating**

The Centre of Excellence in Disaster Mitigation and Management was established at IIT Roorkee in March 2006 to initiate multidisciplinary studies & national capacity building in Disaster Mitigation Engineering. Initially focus is on four natural disasters earthquake, landslide, cyclone and flood. The Core faculty group and facilities are drawn from four participating departments Civil, Earthquake, Earth Sciences and Hydrology.

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.

## **3. Centre for Nanotechnology**

Centre of 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 four 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, a new M.Tech. program on 'Nanotechnology' has been initiated by the centre. This course is aimed at providing the basic know how 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 modeling and simulation, physics, chemistry, biological and technological aspects of nanomaterials. Besides, it will provide students a practical training of advanced methods being employed for the characterization and elucidation of different nanostructures. This expertise could be utilized to fabricate new materials and nanodevices. This programme is coordinated by the Department of Met. & Mat. Engg.

## **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 of Management; Environmental Planning.

## **ALTERNATE HYDRO ENERGY CENTRE**

Small Hydropower Planning, investigations, designs, development, optimization of generation, development of softwares for shp planning and designs, life assessment and life extension of existing shp equipment, planning of natural resources, Biomass gasification; Biogas generation from agricultural wastes; Biomass Energy System Development; Environment Impact Assessment; Environment & Energy Auditing; Power System Planning & Operation; Control System Development; Solar & Wind Energy System Development; Solar Air heaters development; Integrated Renewable Energy System Development; Human Resource Development.

## **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 mechanism of action studies; 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 of 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; 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 specialization - 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 structural engineering.

### **Environmental Engineering**

Aerobic and Anaerobic Treatment Wastewaters; Design of air pollution control Equipments; 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**

Dispersion phenomenon in atmospheric flows and river flows; Flood forecasting; 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.

## **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 blasé 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.

## **Computer Aided Design**

Modelling, Analysis and Simulation, computer Aided Analysis & Design, Application to Problems of Civil Engineering, Expert Systems, Artificial Intelligence, Neural Networks.

## **EARTHQUAKE ENGINEERING**

Structural Earthquake Engineering, Seismic Behaviour and Design of RC, Steel and Masonry Structures; Performance Based Design; Seismic Analysis and Design of Dams, Nuclear Reactors, and Power Plants; Seismic Evaluation and Retrofit; Active and Passive Control; Structure Optimization; Structural Design for Blast and Impact; FEM and DEM Applications; Nonlinear Modelling and Analysis; Seismic Safety of Building Services and Equipment; System Identification, Damage Detection and Health Monitoring; Geotechnical Earthquake Engineering, Dynamic Soil Properties, Seismic Analysis and Design of Foundations; Wave Propagation and Ground Response Analysis; Liquefaction Studies; Non-linear Constitutive Models of Soils; FEM and DEM Analysis of Geotechnical and Rock Structures; Dynamic Soil-Structure Interaction, Deep Foundations, Machine Foundations, Model Studies using Geotechnical Centrifuge, Dynamic Earth Pressure and Retaining Walls, Soil Improvement Techniques, Reimforced Earth and Geotextiles under Seismic Loads, Geotechnical Field Exploration; Seismic Behaviour and Design of underground structures. Engineering Seismology, Seismotectonic Modelling, Probabilistic and Deterministic Seismic Hazard Assessment, Local Site Effects, Site Specific Earthquake Design Parameters, Strong Motion Attenuation, Medium and Path Characterisation, Crustal Deformation, Simulation of near field motion, SAR Interferometry, Remote Sensing and GIS applications, Earthquake Prediction. Instrumentation Technology; Seismological and Strong motion network and instrumentation, Data Acquisition and Discrete Time Signal Processing; Design and development of Earthquake Recording Equipment; Processing and Analysis of Ground Motion Records. Seismic Vulnerability Assessment, Seismic Risk Assessment, Seismic Microzonation; AI Applications in Earthquake Engineering.

## **EARTH SCIENCES**

### **Geology**

Engineering Geology; Environmental Geology; Geochemistry and Petrology; Geotechnical Investigation; Ore Geology; Petroleum Geology; Remote Sensing and GIS; Sedimentology; Stratigraphy and Paleontology; Structural Geology; Waste Disposal

## **Geophysics**

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

## **ELECTRICAL ENGINEERING**

### **Electric Drive & Power electronics (EDPE)**

Improved quality multi quadrant solid state converter; Multi level converters & Inverter; 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 ; Automation of power plant ; High phase order drives; Machine. Design.

### **Measurement & Instrumentation (M&I)**

Biomedical Instrumentation; Digital signal and Image Processing; Industrial instrumentation; Power system Instrumentation .control and protection; process instrumentation & control; Medical Imaging & signal processing , Model Order Reduction application in instrumentation & control, Telemetry and Remote Control.

### **Power System Engineering (PSE)**

Adaptive relative and protection; Economic dispatch and planning; Flexible AC transmission system; Monitoring operation and control of power system; Surge phenomena in power system engineering ; Deregulation an Restructuring of power systems; Distribution system automation; power quality and HVDC transmission.

### **System Engineering and Operation Research (SEOR)**

Computer controller system including process control; Modeling and model order reduction; optimal system Operation; Robotic, steady State and dynamic Analysis of systems; Power Quality and its Impact. FPGA Based Digital Design, System Reliability. Image processing; Computer vision, Image/Video processing, Human computer Interactions, Pattern recognition.

## **ELECTRONICS AND COMPUTER**

Digital Communications over MIMO Systems, Adaptive Signal Processing Techniques, Interference Suppression in MC-CDMA/OFDM Systems, Channel Coding for Wireless Communication, Nanoscale Memory Design, Low Power Digital VLSI Systems, Novel Nanoscale MOS based Devices and Circuits, Neural Networks and Fuzzy Control, Digital Image Processing, Robotics, Computer Vision, Real Time Systems, Fault Tolerance, Multiprocessors Scheduling, Multimedia Systems, Computer Networks and Security, Parallel and Distributed Processing, Artificial Intelligence, Mobile Computing, Soft Com-

puting, Database and Data Mining, Bio-informatics, Computational Electromagnetics, Reconfigurable Antennas, Meta materials, Soft-computing Techniques in RF, RFIC, MMIC, Dielectric Integrated Guides and Circuits at mm wave and Optical Frequencies, Microwave and Optical Remote Sensing, High Power Gyrotrons/Electron Cyclotron Masers for Thermonuclear Fusion and THz Applications, Compact Microstrip Antennas for Wireless Applications.

## **HUMANITIES AND SOCIAL SCIENCES**

Economics, English, Psychology, Sociology and Fine Arts.

## **HYDROLOGY**

**Surface Water Hydrology:** Water availability and design flood studies: Hydrological data collection, processing and analysis; Water Resources Planning and System Studies; Reservoir Operation Studies; Hydrological investigations and planning.

**Ground Water Hydrology:** Ground Water Modelling & Recharge Estimation; Hydrogeological and Geophysical Studies.

**Watershed Hydrology:** Watershed Modelling & 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**

General Management, Financial Systems, e-Governance, Knowledge Management, Knowledge Economy

Mathematical Finance, Physics of Complex Systems etc.

Human Capital Creation, Knowledge Management Leadership and Mentoring Skills, Competency Management, Talent Management

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.

Marketing, International Business, Supply Chain Management, Customer Experience Management, Strategy, Ethical and Social Responsibilities of Business. Quantum Information Theory and Quantum Computing; Optimization, Operations Management, General Management including Indian Philosophy vedic values, Rural Management & Marketing. Education Business Management, Management Teaching, Management of family owned business, Bottom of the Pyramid Markets & Business opportunity development.

### **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.

### **MECHANICAL AND INDUSTRIAL ENGINEERING**

Machine Design Engineering; Production and Industrial Engineering Systems; Thermal Engineering; Welding Engineering.

Advanced fluid mechanics; Arc stability analysis; Combustion and IC engines; Computational Fluid Dynamics, Computational mechanics, Computer aided design; Computer aided process planning; Computer aided manufacturing; Experimental stress analysis; Energy systems; Flexible manufacturing systems; Fracture mechanics; Heat transfer; Metal casting; Machine tools and metal cutting; Noise control and vibrations; Product design; development and ergonomic evaluation; Refrigeration and air conditioning; Solid mechanics; Solar energy; Tribology and rotor bearing dynamics; Turbomachines Tribology of material; Unconventional machining processes; Vehicle dynamics and tyre mechanics; Wear Welding engineering; 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 and 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 & Development. Erosion & Corrosion Resistant 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 of atmospheric 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.

#### **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;

Nuclei far from stability; Nuclear Astrophysics; Shell Model.

### **Fiber Optics**

Specialty optical fibers; microstructured fibers; fiber amplifiers and lasers; larg-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.

### **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; Wood chemistry; Applied Mathematics; Industrial Mathematics; Instrumentation and Control; Electrical Engineering; Mechanical Engineering and Production Engineering; Polymer Science and Technology.

### **WATER RESOURCES DEVELOPMENT TRAINING CENTRE**

Surface and ground water hydrology, water resource system planning and management Hydraulic and Structural design of water 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 & 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 ELIGIBILITY**

An applicant possessing the following qualifications in appropriate areas shall be eligible to apply for admission for Ph.D. programme of the Institute.

- (a) Masters degree in Engineering / Technology/ Architecture/Urban & Rural Planning/Sciences/ Humanities & Social Sciences and Management 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.

### **OR**

Applicants with B.Tech./B.Arch. degree or equivalent in respective discipline with excellent academic record (with a minimum CGPA of 7.00 on a 10 point scale or equivalent or 70% marks) may be considered eligible for admission.

- (b) Applicants for admission for full-time studies who do not possess a M.Tech./M.Arch./MURP degree or equivalent in the relevant field must have a valid GATE score (at least 75 percentile) for Engineering / Technology/ Science disciplines or must have qualified national level fellowship examinations such as NET (JRF/LS) conducted by UGC/CSIR for

Science/ Humanities and Social Sciences disciplines. However Engineering/Architecture graduates without GATE from IIT/University of Roorkee having CGPA Score  $\geq 8.00$  or marks  $\geq 80\%$ .

## 7. RESERVATION / RELAXATION

- a) For the SC/ST/PD applicants and for others holding Master's Degree (M.A. with English) seeking admission to Ph.D. English in the Department of Humanities and Social Sciences the eligibility requirement of CGPA may be relaxed to 5.50 on a 10 point scale or equivalent, or to 55% marks.
- b) The SC/ST/PD applicants holding B.Tech. Degree or equivalent may be allowed 5% relaxation in marks or equivalent relaxation in CGPA.
- c) Physically handicapped applicants may be permitted relaxation in eligibility requirement of CGPA to 5.50 on a 10 point scale or equivalent, or to 55% marks. They will not be allowed any other relaxation beyond this limit even if they belong to SC/ST category and/are holders of the Degree of M.A. in English etc.
- d) For the SC/ST/PD applicants minimum GATE score requirement will be 50 percentile.
- e) Reservation for OBC/SC/ST/PD will be as per Central Govt. of India directive/Institute rules.

### Admission of Institute Faculty/ Staff

- a) A member of non-academic staff of the Institute who satisfies eligibility qualifications may be considered for admission to the Ph.D. Programme as a part time student provided he/she has been given administrative clearance by the Director of the Institute. Those with B.Tech./B.E./M.Sc./M.A. or equivalent qualification and with less than two years of relevant working experience must have a valid GATE score or must have qualified any national level examination conducted by UGC/ CSIR, etc.
- b) Permanent academic staff of the Institute may be given administrative clearance to seek registration on part-time basis after satisfactory completion of the period of probation subject to the recommendation of the concerned Head of the Deptt./ Centre. Such applicants need not clear GATE or equivalent national examination even if

they do not have a M.Tech. degree.

## 8. ELIGIBILITY FOR PART-TIME Ph.D.

*(only to candidates working in the organization having R&D Sections and public sector undertaking recognized by IITR and/or having MoU with IITR)*

- a) the applicant possess the minimum entry qualifications for the degree as given in under admission eligibility clause;
- b) the applicant proves that his/her official duties permit him/her to devote sufficient time to research;
- c) facilities for pursuing research are available at the applicant's place of work recognised for the chosen field of research; and
- d) 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 Organisations/ Institutions located within a distance of 100 Km from the Institute).
- e) The facility of part time registration will be available only to candidates working in the organisation having R&D Sections and public sector undertakings recongized by IIT and/or having MoU with IITR. 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.

If the course credit requirement recommended by a Deptt./Centre is more than 12, then the residency requirement for part time Ph.D. students holding degrees from the other Institutes / Universities and working in the organisation outside Roorkee will be 12 months.

## 9. 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).

## 10. FINANCIAL ASSISTANCE

Few MHRD Assistantship/ Fellowship may be available as per regulation.

## 11. 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 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.

## 12. Minimum Qualification for admission to Ph.D. Programme in Different Discipline

### 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*

- i. M.E./M.Tech. in Solid State Electronics/ Microwaves / Communication Systems / Control Systems / Information Technology / Instrumentation/ Computer Science & Engg./ Information Science/ MCA or equivalent.
- ii. B.E./B.Tech. in Electronics & Communication/ Computer Sc. & Engg./ Electrical Engg. / Information Technology or equivalent.
- iii. M.Sc. in Physics/ Maths/ Instrumentation/ Electronics.
- iv. Candidates not covered by (i), (ii), (iii) above but having B.E./M.Sc./M.Tech. in any other area may also be considered provided they have sufficient background and experience in the areas of interests to the department.

### 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*

- i. B.E./Masters degree in Earthquake, Civil, Mechanical, Electrical, Electronics, Hydrology, Geology, Geophysics, Geochemistry or equivalent.
- ii. M.Sc./M.Tech./M.Sc.(Tech.) degree in Physics, Chemistry, Mathematics, Statistics, Life Sciences, Marine Sciences, Environmental Science, Atmospheric Sciences or equivalent.

### 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.

## **POST-DOCTORAL FELLOWSHIP**

### **13. Guidelines for Award of Post-Doctoral Fellowship**

**Qualification:** Candidate with a Ph.D. degree in Science and Engineering or those who have recently submitted their doctoral theses can apply.

**Age:** Criteria for age should be same as for Ph.D.

**Duration :** 2 years (renewable for one more year).

**Fellowship :**

(i) Rs. 25,000/- p.m. for a Ph.D. with 2 years experience

(ii) Rs. 20,000/- p.m. for a recent Ph.D. degree holder.

**Contingency :** Rs. 20,000/- per annum.

**H.R.A. :** As admissible

**Desirable:** First class in degree preceding to Ph.D. and publications in journals of repute.

**Selection Procedure:** Screening/Recommendation will be done by the DRC/DFB of the concerned Department as per the criteria laid down by the Institute and Department/Centre.

## ADMINISTRATIVE OFFICERS & HEADS OF DEPARTMENTS/ CENTRES

		Office Telephone No.
Director	S.C.SAXENA	285500, 272742
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Dean, Academic Research	Hari Om Gupta	285255
Associate Dean, Academic Studies	Pramod Agarwal	285835
<u>Head of the Departments/ Centres</u>		
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Bio Technology	Ritu Barthwal	285216
Chemical Engineering	I.D. Mall	285217, 276534
Chemistry	Kamaluddin	285218
Civil Engineering	G.L.Aswa	285219
Earthquake Engineering	Ashwani Kumar	285228
Earth Sciences	R.P.Gupta	285232
Electrical Engineering	Vinod Kumar	285231
Electronics & Computer Engg.	S.N. Sinha	285235
Humanities & Social Sciences	S.P. Singh	285234
Hydrology	Himanshu Joshi	285236
Management Studies	V.K.Nangia	285014
Mathematics	Rama Bhargava	285249
Mechanical & Industrial Engg.	Pradeep Kumar	285242
Metallurgical & Materials Engg.	S.K.Nath	285606
Physics	B.D. Indu	285248
Pulp & Paper Technology (Saharanpur Campus)	J.S.Upadhyaya	2727354
Water Resources Development & Management	Ram Pal Singh	285251
Registrar	Lt. Col. A.K. Srivastava (Retd.)	285311, 272430

For further details please contact



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