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NOTE : COMPLETED APPLICATION FORM ALONGWITH THE BANK DRAFT OF Rs. 200/- IN FAVOUR OF REGISTRAR, IITR PAYABLE AT ROORKEE BE SENT TO THE OFFICE OF ASSISTANT REGISTRAR (PGS & R).

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 19 academic departments/centres offering 11 undergraduate courses in engineering and architecture, 3 dual degree programmes and 6 Integrated Dual Degree in M.Sc./engineering and over 51 postgraduate courses in engineering, architecture, sciences, computer applications and business administration besides research programmes at doctoral level.

Prior to becoming an IIT, the University of Roorkee was accredited by the National Assessment and Accreditation Council (NAAC), an autonomous institution of the University Grants Commission (UGC), with FIVE STARS (*****) for a period of five years in the year 2000. This is the highest grade that NAAC awards on five-point scale.

IIT Roorkee has a highly qualified and motivated faculty of about 350 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 1989 undergraduate students, 1410 postgraduates and nearly 706 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 3.10 lacs volumes of books and periodicals, Information Superhighway Centre with Internet connectivity, an Audio Visual 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, 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.

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 Station.

CENTRES FOR EXCELLENCE:

- (1) Centre for Transportation Systems(CTRANS)
- (2) Centre of Disaster Mitigationing
- (3) Centre of Nanotechnology

CENTRAL FACILITIES

Audio Visual Research Centre

The Audio Visual Research Centre (AVRC) provides valueable 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 Computer Centre

Computer Centre is a service centre in the form of a central facility. The Centre meets the requirements of the entire community of undergraduate and postgraduate students research scholars and faculty members working in different research fields. Total number of users at the Centre is around 2000. The facilities at the Centre are available from 8.00 am to 11.00 pm.

The Computational Facilities at the Centre are based on the following Hardware: A PARAM 10000 Super Computer; Five Servers-one IBM RS/6000, One SGI Origin, and Three Alpha Servers; Sixty Terminals Twenty intelligent Terminals, Ten SunRay Terminals and Thirty Dumb Terminals; Fifty Pentium Personal Computers (PC's), All the PC's and the servers are networked through structure cabling; the peripherals include an AO size Scanner & Plotter; two line printers; one Ink jet printer, and two Laser printers.

Range of Softwares available include: C and C++ Compilers; oracle, DB2, Database Management Software; Lotus notes and Domino Internet/Internet Software; office 2000, Visual Studio etc.

Available environments include: UNIX, LINUX, WINDOWS NT, SCO etc.

Institute Computer Centre

The Institute Computer Centre is the central computing facility having PARAM 10000 Super Computer and Linux based Cluster for High Performance Computing. ICC has setup a Grid Head Node of the "National Grid Computing Initiative" – Garuda Project by C-DAC and ERNET, which provides high performance computing facility of the order of few tera-flops.

Centre has a range of servers from Intel based servers 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 hardware and software for applications such as: CAD/MCAD, Image Processing / Scientific Visualization, 3DAnimation/ Visual Simulation/ Geospatial imaging and analysis. Centre has mid-range to high-end configured graphics workstations with MIPS R16000 64 bit RISC based (SGI)/ AMD Opteron /Xeon EM64T /PIV EM64T CPUs. Centre is also equipped with colour laser printer, network laser

printers and scanners. Each desktop is connected to servers through structured cabling.

ICC's software licensing facility provides some of the following major engineering and scientific softwares available throughout the campus over LAN: MATLAB 7.2 R2006b, ArcGIS 9.1, SPSS 14.0, Mathematica 5.0, NAG Libraries and Compilers, Intel Visual Fortran, Felix for Nuclear Magnetic Resonance (NMR) spectral data off-line processing, ChemOffice Ultra 10.0, MagNet 64 bit v 6.22.1, ABAQUS 6.6-3, Pro/ENGINEER Wildfire 3.0, Solid Edge 18.0, Mechanical Autodesk Inventor Series 11, Maya 5.0, Oracle 9i & 10g and MS Visual Studio.Net 2005, Microsoft Campus Agreement for MS software products.

Computer Centre is spread over two floors having two control rooms and the following labs: Param Lab, PC Lab, Workstation Lab, Internet Access Labs, Thin client technology Lab, Unix/Linux Lab and Project Lab. Computer Centre renders services on all 7 days/week 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.

Centre also provides dedicated systems at ICC with specialized software required by the PG students during their dissertation/thesis period. Information Superhighway Centre

The Institute has a star topology Gigabit Ethernet Switch based, state-of-the-art Enterprise class network with data, voice and video communication capabilities. All departments and centres are connected to the Information Superhighway Centre which acts as the nodal centre for outside/inside connectivity to the campus through Optical Fiber. The network covers 365 acres of area through 25 Km of OFC and 55 km of E CAT 5 UTP, connecting all Departments/Centres, Hostels and DPT Saharanpur. The Intranet has 2700+ I/Os providing internet/intranet, and e-mail facility to all faculty, students, staff, library, and laboratories. Institute has 34 Mbps internet leased line link from VSNL, New Delhi and 1 Mbps SCPC VSAT based link from ERNET India, New Delhi.

All five research scholar Hostels have wired line internet connectivity in each room. Under Graduate/ Graduate hostels have Cyber cafe equipped with 20 desktop for internet connectivity. To provide internet connectivity in each room of Under Graduate/Graduate Hostels wireless project is under implementation which will be completed by the end of February 2007.

Saharanpur campus is connected to IIT Roorkee campus with 2 Mbps dedicated leased line in a close group and have a state-of-the-art enterprise network,

which provide Gigabit connectivity to each desktop in the campus through optical fiber.

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.

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 fulfil 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-books and other kinds of monographs to its members. It has well bound collection of more than 3.10 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 8000 e-journals 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 6 servers and more than 70 workstations on its Local Area Network. From next semester, the library will be functioning from the new state of art building which shall provide unmatched facilities.

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, drug DNA and protein- DNA interactions; Microbial Bioconversions, Microbial Processes; Animal physiology- Reproductive Endocrinology; Microbial Production of Organic acids and Enzymes; Molecular Biology; Molecular Genetics of Nitrogen fixation; Plant Biochemistry-Enzymology Molecular Pathogenesis; Environmental Biotechnology; Molecular Modelling; Molecular Biophysics; Microbial Transformations and Fermentation Processes; Fertility Control Mechanisms in male system; Sperm-egg interaction; Biochemical Engineering; Bioprocess Engineering; Downstream Processing; Enzyme Engineering.

CHEMICAL ENGINEERING

Advanced Transfer Processes (ATP); 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; Transport Phenomena; Hydrocarbon Engineering.

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; Remote Sensing and Photogrammetric Engineering; Structural Engineering; Transportation Engineering; Diversified areas of specialization - Bridge Engineering - Rock Mechanics - Traffic 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 improved 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

Capacity analysis of urban roads and intersections; Economic evaluation of transportation systems; Fibre

reinforced, ferro-fabrocrete pavements; Integrated analysis of transport modes; Material characterization; Open sky policy in domestic air travel market; pavement analysis design and evaluation; Pavement management system; Privatization of road transportation system; Urban transport environment interaction; Regional, Rural and Urban planning.

Computer Aided Design

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

EARTHQUAKE

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, Reinforced 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

Measurement and Instrumentation (M&I)

Biomedical instrumentation; Digital signal and Image processing; Industrial instrumentation; Power system instrumentation, control and protection; Process instrumentation and control, medical imaging. Model Order Reduction Application in Instrumentation & Control, Telemetry and Remote Control.

Power System Engineering (PSE)

Adaptive relaying and protection; Economic despatch and planning; Flexible AC transmission system; Monitoring, operation and control; Surge phenomena in power system engineering; Deregulation and Restructuring of power system; Distribution system automation; Power quality and HVDC transmission.

Power Apparatus and Electric Drives (PAED)

(Likely to be renamed "Electric Drives & Power Electronics)

Improved Quality multi quadrant solid-state converters; High performance computer controlled DC and AC drives; Performance analysis of computer controlled electric drives; Active Power filters; Intelligent condition monitoring of electric drives; variable speed constant frequency generators; Automation of power plants. High Phase Order Drives; Machine Design.

System Engineering and Operations Research (SEOR)

Computer controlled 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.

ELECTRONICS AND COMPUTER

Digital Communications over MIMO Systems. Adaptive Signal Processing Techniques. Interference Suppression in MC-CDMA/OFDM Systems. Channel Coding for Wire- less Communication. VLSI Design: 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 Computing. Database and Data Mining. Bio-informatics. Computational Electromagnetics. Reconfigurable Antennas. Meta materials. Soft-computing Techniques in Microwave Engineering. RFIC. MMIC. Dielectric Integrated Guides and Ckts at mm wave and Optical Frequencies. Microwave and Optical Remote Sensing. High Power Gyrotrons/ Electron Cyclotron Masers for Thermonuclear Fusion and THz Applications. Studies on Compact Microstrip Antennas for Wireless Applications.

HUMANITIES AND SOCIAL SCIENCES

Economics, English and Psychology.

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

Finance and General Management

Prof. J.P. Singh

Mathematical Finance, Physics of Complex Systems etc.

Dr. S. Rangnekar

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

MATHEMATICS

Approximation theory; Bio-mathematics; Computer Software; Entire functions; Functional Analysis and Theory of Distributions; Fracture Mechanics; Heat transfer in fluids; Mathematical modelling; Magnetohydro-dynamic flows; Mechanics of composite materials; Non-Newtonian fluids; Numerical Techniques; Optimal control theory; Operations research; Optimization in crisp fuzzy and stochastic environments; Parallel computing; Programming languages and computer software; Queueing theory; Relativistic cosmology; Reliability theory; Robotics and control; Statistics and tomography; Summability theory; Stability problems; Special functions; Thermoelasticity and heat transfer; Theory of relativity; Vibrations of beams and plates; Vibration of turbine blades; Image processing, Applied algebra, complex Analysis, Computational Fluid Dynamics, Symbolic Computation, Cryptography, Discrete Mathematics, graph theory.

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

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.

Nuclear Physics

Dynamical symmetries and application of special groups 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.

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.

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,

- v To develop synergy between creativity, innovation and the frontiers of knowledge in the chosen field of study,
- v To develop ability and skills to carry out independent research and development to face the challenges posed to mankind on specific problems, and
- v 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.

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/ 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 (for science disciplines candidate must have qualified GATE/NET etc.).

Or

Applicants with B.Tech. 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. 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.

RESERVATION / RELAXATION

- a) For the SC/ST 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 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 applicants minimum GATE score requirement will be 50 percentile.
- e) Reservation for SC, ST and OBC (Other Backward Classes) 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 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.

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 official duties permit him 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.

FINANCIAL ASSISTANCE

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

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 (PGS & R).

GENERAL

- (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 candiadte who is found admitted to a course to which he/she is not entitled, being unqualified or ineligible in accordance with the statues and regulations in force.
- (iii) Disputes if any, arising out of or relating to any matter whatsoever, concerning the afforesaid shall be subject to the exclusive jurisdiction of Roorkee Court.

Eligibility 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
- ii. B.Tech./M.Tech. degree in any branch of Engineering may be considered for research areas consistent with the academic background and special interests.
- iii. M.Sc. Degree in any branch of Science 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 this 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. M.Sc./M.Tech./M.Sc. (Tech)/M.Phil. degree in Geology, Geophysics, Geochemistry or equivalent.

- ii. M.Sc./M.Tech./M.Sc. (Tech)/M.Phil. degree in Physics, Chemistry, Mathematics, Life Sciences, Marine Sciences, Atmospheric Sciences or equivalent and having Geology/ Geophysics/ Geochemistry at the B.Sc. stage as principal subjects.
- iii. Candidates with Postgraduate degree in Science/Engineering/ and employed in a field / research area related to Earth Sciences may be considered for Ph.D. programme as external candidates, on a case to case basis depending on the research areas of the department.

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 / 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.

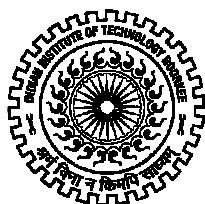
19. Alternate Hydro Energy Centre

- 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.

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Chemical Engineering	Shri Chand	285217, 276534
Chemistry	Ravi Bhushan	285218
Civil Engineering	G.L.Aswa	285219
Earthquake Engineering	D.K.Paul	285228
Earth Sciences	R.P.Gupta	285232
Electrical Engineering	S.P. Gupta	285231
Electronics & Computer Engg.	D.K.Mehra	285235
Humanities & Social Sciences	Renu Rastogi	285234
Hydrology	N.K.Goel	285236
Management Studies	V.K.Nagia	285014
Mathematics	S.P.Sharma	285249
Mechanical & Industrial Engg.	Pradeep Kumar	285242
Metallurgical & Materials Engg.	S.K.Nath	285606
Physics	Jagdish Rai	285248
Pulp & Paper Technology (Saharanpur Campus)	J.S.Upadhyaya	2727354
Water Resources Development & Management	S.K.Tripathi	285251
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