Rolling Advertisement No. K-15/2024-2025

Areas of Specialization

Sr. No.	Academic Unit	Areas of Specialization
1	**Aerospace Engineering**	**Aerodynamics:** Low-speed experimental aerodynamics **Aerospace structures:** Structural health monitoring, Experimental mechanics and/or modeling of high-temperature materials, NDE Wave propagation, and damage detection in aircraft structural materials, Computational or mathematical methods with a focus on digital twin development. **Propulsion:** Electric propulsion, Cryo and semi- cryo rocket engines **Dynamics and Control:** Space engineering, Aerial robotics, and Navigation. Application of AI/ML and numerical techniques to aerospace and related multi-physics systems.
2	**Biosciences & Bioengineering**	**1. Medical Instrumentation:** medical imaging in any modality; instrumentation for electrophysiology; diagnostic/monitoring instrumentation; surgical/interventional instrumentation. **2. Medical Signal & Medical Image Processing:** electrophysiological signal processing (Evoked potentials, EEG, EMG, ECG, etc.), in vivo medical image processing. **3. Physiological Systems Modelling**: cardiovascular system modelling; musculoskeletal modelling; respiratory system modelling; systems control perspective to physiological modelling. **4. Data Science for Biomedical Engineering:** digital health (AI/ML/IoT) applications at the hospital/clinical level. Additionally, candidates must have a basic degree in engineering or physical sciences (biomedical, electrical, instrumentation, mechanical, computational, systems control; physics, math, statistics), with a research background at the human systems and/or whole organ level having closely worked in the physiological systems/clinical domain and future research plans at the human systems/whole-organ level. Research work at the sub-cellular, cellular, and tissue levels will not be considered.
3	**Chemical Engineering**	Candidates with at least one chemical engineering degree (UG/PG/Ph.D.) will be considered under all six broad research areas of chemical engineering (see below). Those without chemical engineering degree will be considered only if their core research falls under the specific sub-areas (a.,b.,

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		etc.) under the following six broad research areas of Chemical Engineering: **1. Biotechnology and Biosystems Engineering** a. Synthetic biology b. Cell and gene therapy; drug delivery **2. Catalysis and Reaction Engineering** a. Experimental catalysis b. Membrane synthesis and technologies c. Battery material development and scale up **3. Soft Matter** a. Sustainable materials and circular economy of materials b. Aerosol reaction engineering and aerosol nanomaterials 4. Process Systems and Controls Engineering a. Process Systems Engineering for sustainability b. AI/ML in process design and operations **5. Complex Flows** a. Experimental fluid and granular mechanics b. Mathematical methods and computational algorithms for complex fluid flows **6. Thermodynamics and Molecular Simulations** a. Quantum simulation of reactions on quantum computers b. Charge transfer theory c. Molecular Modelling for Sustainability
4	**Chemistry**	Will be updated soon
5	**Civil Engineering**	The candidates should have a strong academic and research background with Ph.D., including a basic minimum 4-year undergraduate Engineering degree in Civil Engineering or related areas. 1] CE1 (Transportation System Engineering): (1-i) Transportation Economics and Finance; (1-ii) Pavement Systems Analysis, Design and Modelling; (1-iii) Rail transportation planning and operations; and (1-iv) Air transportation planning and operations. 2] CE2 (Geotechnical Engineering): (2-i) Rock Engineering; (2-ii) Centrifuge modelling of Geotechnical structures; (2-iii) Environmental Geotechnology; (2-iv) Soft Ground Engineering. 3] CE3 (Water Resources Engineering): (3-i) Experimental and/or Computational Hydraulics; (3-ii) Environmental Hydraulics; (3-iii) Groundwater Hydrology 4] CE4 (Structural Engineering):

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		(4-i) Structural Performance under Natural and Man-made Hazards; (4-ii) Advanced Materials and Systems; and (4-iii) Computational Mechanics. 5] CE5 (Ocean Engineering): (5-i) Offshore Engineering; (5-ii) Physical Oceanography. 6] CE6 (Remote Sensing): (6-i) Photogrammetry; (6-ii) LiDAR; (6-iii) Geodesy; (6-iv) Geographic information science and geocomputation. (6-v) Remote Sensing & GIS Applications 7] CE7 (Construction Technology and Management): (7-i) Building Physics and Modelling; (7-ii) Automation and Robotics in Construction. (7-iii) Urban Planning (7-iv) Modelling/Simulation of Concrete behaviour (Hydration, Durability) (7-v) Fracture Mechanics of Concrete Candidates with exceptional credentials in other areas of Civil Engineering are also encouraged to apply.
6	**Computer Science & Engineering**	Will be updated soon.
7	**Earth Sciences**	1. Groundwater Hydrogeology 2. Mineral Exploration/Ore Geology 3. Mathematical Geology/Geostatistics 4. Tectonic Geomorphology 5. Quantitative Seismic Interpretation/ Seismic Reservoir Characterization 6. Petrophysics related to petroleum exploration 7. Computational Geophysics / Geophysical modelling 8. Geophysical Signal Processing Revised: For all positions in Geology (from no. 1 to no. 4) Essential Qualifications: a) M.Sc / M.Sc (Tech)/ M.Tech degree in Geology or in any of the fields related to Geology b) Ph.D. in the relevant field of Geology Desirable: Experience in running and maintaining relevant equipment, with adequate exposure to experimentation and all aspects of field geology, computation and numerical modelling. For all positions related to Geophysics (from no. 5 to no. 8) Essential Qualifications: a) M.Sc / M.Sc (Tech)/ M.Tech degree in Geophysics or in any of the fields related to Geophysics b) Ph.D. in the

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		relevant field of Geophysics Desirable: Industrial experience in the fields related to petroleum exploration with experience in quantitative and/or qualitative seismic interpretation. Experience in application of AI and ML techniques to geophysical applications.
8	**Economics**	Development Economics, International Economics, Macroeconomics, Monetary Economics, and Public Economics.
9	**Electrical Engineering**	1. Communication Theory, Systems and Networks: Millimeter Wave/Microwave Circuits, Systems & Antennas, Communication Systems Hardware, Optical Communication, Quantum Communication, Information Theory, Cryptography; Multimedia Signal Processing; Machine Learning and Big Data 2. Theoretical and computational methods in the area of control including Computational/numerical methods: Nonlinear, optimal and robust control, Optimization and semidefinite programming, Complex networks/systems, Adaptive control, Game theory, Model Predictive control, Stochastic/uncertain systems, Randomized algorithms, System identification/estimation, Intelligent systems, biologically-inspired methods, evolutionary computing, Fault detection, identification and fault-tolerant systems, Hybrid and switched systems, Distributed, decentralized and multi-agent systems. 3. Power Electronics & Power Systems 4. Analog, Digital, Mixed-signal and RF Integrated Circuit & System Design, Biomedical circuit & systems, Neuromorphic circuits, In-memory and near-memory computing. 5. Digital System Design, Test and Manufacturing: System-on Chip, DFM, Computer Architecture & Hardware, Algorithm-to-Chip Level Design, Computer-Aided-Design (CAD) in VLSI 6. Semiconductor Devices and Technology: Fabrication, Characterization, Packaging, and Reliability; Optoelectronics (Sensors); Quantum Technologies and Applications; Power Semiconductor Devices; Bioelectronic/Biomimetic Devices, Energy Conversion and Storage; Oxide Electronics and MEMS/NEMS, Bio and flexible electronics, logic memory AI, Photovoltaics. Exceptional candidates from other areas of Electrical Engineering will also be considered.
10	**Energy Science and Engineering**	Will be updated soon.

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11	**Environmental Science & Engineering**	Will be updated soon.
12	**Humanities and Social Sciences**	Will be updated soon.
13	**Industrial Engineering and Operations Research (IEOR)**	**1. Industrial Engineering:** Operations planning & scheduling, Inventory control, Facility & work systems design, Quality, Reliability, Safety, in Industrial and/ or Service systems. **2. Digital Enterprise & Automation:** Digitalisation & Digital Twinning, Industrial IoT, Edge computing, Cyber-Physical systems, Blockchain, Security, Robotics. **3. Data Science:** Artificial Intelligence, Machine Learning, Reinforcement Learning, Change point detection, Computational Data Science, Human-AI interaction, Deep Learning, Large language models, Generative AI. **4. IEOR Applications** to areas such as Transportation & Mobility, Logistics, Supply Chain, Healthcare, Finance, Energy, Sustainability, Public Sector Organizations, Defence. **5. Operations Research:** Optimisation, Stochastic processes, Stochastic control, Game theory, Simulation, System dynamics, Approximation & randomized algorithms, Meta-heuristics, Network science, Quantum Computing. Candidates with exceptional credentials in any area of IE and OR, in addition to the above specific areas, may be considered. Desirable: ● For Area 1, UG and/or PG degree in Industrial Engineering or equivalent is desirable. ● For Area 2, Experience in using, installing and/or maintaining relevant equipment, sensors, etc. with adequate exposure to experimentation, numerical modelling and computations is desirable.
14	**Mathematics**	● Statistics (both theoretical and applied) ● Combinatorics Strong applications across all areas of Mathematics will also be considered.
15	**Mechanical Engineering**	1. **AI/ML and Computational Engineering:** (1-i) Development and applications of Data-driven methods in Thermo-fluid engineering; (1-ii) Computational Plasma Engineering; (1-iii) Data-driven constitutive modeling of Cells, Tissues, and Organs; and (1-iv) Digital Manufacturing (system simulation, digital threads, digital twins, and manufacturing analytics)

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		2. **Biomechanical Engineering:** (2-i) Biomedical flows; (2-ii) Bio-heat transfer; (2-iii) Computational and experimental mechanics of biological materials; 2 (iv) Kinematics and Dynamics of human/animal Locomotion; and (2-v) 3D-Organ-Printing 3. **Heat Transfer, Combustion and Energy Systems:** (3-i) Refrigeration, Air-conditioning, Cryogenics, and heat pumps; (3-ii) Thermal Management of EV batteries and data centers; (3-iii) Hydrogen combustion; (3-iv) Radiative heat transfer for defense and space applications; and (3-v) Nuclear Engineering: Neutronics and Radiation Detection 4. **Manufacturing Processes, Systems & Automation:** (4-i) Metal Casting (low-pressure and high-pressure die casting); (4-ii) Manufacturing Systems, Operation modeling and analysis; (4-iii) Manufacturing Automation and Control; (4-iv) Polymer processing, and fiber-reinforced polymer (FRP) composites processing; (4-v) Machine health monitoring and prognostics; and (4-vi) Semiconductor-sensor manufacturing. **5. Materials Modeling and Characterization:** (5-i) Experimental solid mechanics with in situ methods for high temperature materials, battery materials, hydrogen storage, and fuel cells; (5-ii) Reliability, mechanics and failure of integrated circuits and data storage devices; and (5-iii) Advanced Non-Destructive Evaluation (Infrared thermography, Non-Linear Ultrasonics, Tomography, TeraHz radio wave imaging) **6. Micro/Nano Science and Engineering:** (6-i) Transport Phenomena at Nano Scale; and (6-ii) Non-Equilibrium Thermodynamics. 7. **Robotics, Automation, and Control:** (7-i) Learning-based data-driven technologies for robotics and controls; (7-ii) Autonomous Vehicles; and (7-iii) Soft Robotics. 8. **Solid and Fluid Mechanics:** (8-i) Magnetohydrodynamics; (8-ii) Fluid dynamics for Wind and Hydro Energy Applications; (8-iii) Fluid-structure interaction; (8-iv) Atmospheric and Geophysical flows; (8-v) Structural and topology optimization; (8-vi) Engineering Acoustics; and (8-vii) Active Control of Machinery Noise and vibrations. In addition to the above specific areas, applications from candidates possessing exceptional credentials in other areas are also welcome.
16	**Metallurgical Engineering & Materials Science**	(1) Battery Materials (preferably experimentalists), with special emphasis on Solid-State Batteries. (2) Multiferroic Materials and Devices. (3) Semiconductor Thin Films and Processing. (4) Manufacturing (materials joining, additive manufacturing, casting, forming, surface engineering).

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		(5) Corrosion Science and Engineering. (6) Physical Metallurgy (preferably experimentalists) (7) Glass / Ceramics Process Engineering'
17	**Physics**	ACG Galaxy Evolution and High-energy Astrophysics CMP-Expt: Core/demonstrated expertise in single crystal and/or epitaxial growth. CMP-Theory: 1. Development and application of machine learning in quantum condensed matter. 2. Quantum many-body physics using artificial quantum platforms. HEP-Expt: 1. Heavy ion/p-A/p-p collisions at collider energies: Data Analysis and Hardware Development. 2. Experimental Nuclear Physics. HEP-Theory: 1. Astroparticle physics 2. Beyond Standard Model and collider physics 3. Perturbative and non-perturbative QCD 4. String theory Optics: Experimental ion trap/cold atom physics and experimental quantum optics. Quantum Information Theory: Fundamental theoretical research in quantum algorithms, quantum error correction and photonic quantum computing. Soft matter: Experimental Soft Matter Physics and Physics of Biological Systems: 1. Equilibrium and nonequilibrium phenomena in complex fluids. 2. Study of collective behavior and self-assembly using techniques such as light microscopy, AFM, EM, optical tweezers, X-ray scattering. Theoretical statistical physics with a focus on analytical techniques: 1. Analytical theories of model systems in and out of equilibrium. 2. Coarse-grained statistical field theories of non-equilibrium/active systems. 3. Stochastic thermodynamics and information-theoretic approaches to biological systems.
18	**Desai Sethi School of Entrepreneurship (DSSE)**	(1) Technology entrepreneurship, including product design, product development, product and process innovation, intellectual property management, technology licensing.

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		(2) Business models for startups, Customer Behaviour/ Sales /marketing for entrepreneurs, Finance for entrepreneurs (including startup financing), Business Communication for entrepreneurial ventures, Leadership & team building for new ventures. (3) Innovation, Startup incubation, Entrepreneurship Ecosystem, Translational Research & Commercialization, Entrepreneurship Policy, Entrepreneurship Education, Corporate Entrepreneurship, Social entrepreneurship, Entrepreneurial Psychology. (4) Innovation and Entrepreneurship in key application sectors: agri-tech, biotech, edu-tech, fin-tech, med-tech, energy-tech, e-vehicles, environment, smart manufacturing, and other verticals.
19	**IDC School of Design (IDC SoD)**	Industrial Design, Mobility and Vehicle Design, 3D Animation, Human Factors and Ergonomics, Interaction Design, Sound Design and Design Foundational Studies at undergraduate level.”
20	**Shailesh J. Mehta School of Management (SJMSoM)**	Will be updated soon.
21	**Ashank Desai Centre for Policy Studies (ADCPS)**	The Centre is looking for candidates in 5 research areas of Public Policy with particular background in: i. Digital Societies and Governance ii. Social Policy iii. Urban Policy iv. Technology and Policy v. Water, Sanitation, Energy and Climate Change.
22	**Centre for Climate Studies**	● *Climate Science:* o Aerosol-Climate interactions o Field Observations and Monitoring ● *Climate Impacts and Adaptions:* o Climate and Health ● *Climate Mitigation and Policy:* o Mitigation and Development Pathways o National and Sub-National Policies In addition, outstanding applications in any area of climate science or policy will be considered.
23	**Centre for Educational Technology**	Development of technology enhanced learning environments for various purposes; Discipline based education research, in engineering, sciences or computing disciplines; Learning sciences and cognition; Learner modeling using educational data analytics; Teacher use of educational technology; Assessment and evaluation; Technology for foundational literacy and numeracy; Social justice research in the context of technology enhanced learning. Experience with using technology tools for building interventions and carrying out research studies is essential.

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24	**Centre for Machine Intelligence and Data Science (C-MinDS)**	Will be updated soon.
25	**Centre for Systems and Control**	Core areas of dynamical systems and control, autonomous systems, robotics, distributed control, quantum control, learning, and data sciences. Emerging areas of control and decision sciences interacting with classical and quantum information, inference theory, complex systems, high-dimensional phenomena, networking and security, model approximation, communication, signal processing, flexible structures and systems biology. Candidates with strong foundational and/or translational research in the above mentioned core and emerging areas applied to autonomous vehicles, vision, robotics, aerial and space technology, quantum systems, defense technology and fintech are welcome to apply.
26	**Centre for Technology Alternatives for Rural Areas (CTARA)**	Science and Technology applications towards sustainable development using concepts in the following thematic areas: (1) Public Policy and governance (2) Development, Technology, Society (3) Technology, Development Dissemination (4) Agricultural Technology and Innovation (5) Ecology and Livelihoods
27	**Centre of Studies in Resources Engineering (CSRE)**	Will be updated soon
28	**Koita Centre for Digital Health (KCDH)**	(1) AI ML and Large Language Models for Healthcare and biomedical informatics. (2) Computational aspects of biomedical science and engineering, Multi-omics. (3) Healthcare devices, Physiological Monitoring and biomedical signal analysis. (4) Data driven healthcare policy study, and health economics. (5) Quantitative Public Health, disease modelling and epidemiology.