National Institute of Technology Silchar
Silchar – 788010, Assam.
Advertisement for Ph.D. admission for January – June 2025 session

No.: Dean (RC)/105/2023-24/2 Date: 29/11/2024

Applications are invited for admission into **Ph.D. programme** in the following departments with the area/ specializations and admission group as mentioned in the table for the session **January – June 2025**.

ADMISSION GROUP:

There are two Groups (A and B) of admission under Ph.D. Program

GROUP A: Ph.D. Program - Regular Category who may receive fellowship from the MoE / CSIR/UGC or any other recognized funding agency.

Fellowship: As per MoE/ CSIR/ UGC guide lines.

Research Fellowship is available to the scholars who are admitted to Ph.D. programmes in different departments subject to the availability as stipulated by Ministry of Education. The award and renewal of the fellowship is as per the guide lines issued by MoE, from time to time.

In case of students, who secure a new job or otherwise wish to move outside the institute and end their doctoral program prematurely, need to refund any scholarship received.

Eligibility for application in GROUP A:

1. Students for admission into Ph.D. Programs in Engineering Departments must satisfy one of the following criteria:
   i) M.E. / M. Tech. or equivalent with GATE / NET qualification/ Appropriate National Level Examination (Centralized test) in an appropriate area with a minimum CPI of 6.5 (on a 10 point scale) or equivalent (60% of marks). For SC/ST/PwD candidates, a minimum CPI of 6.0 (on a 10 points scale) or equivalent (55% of marks).
   ii) B.E. / B. Tech. with an excellent academic record with valid GATE score and with a CPI of at least 8.0 (on 10 point scale) or equivalent (75% of marks). For graduates from IITs/NITs, the minimum CPI requirement is 7.0 (on 10 point scale). For SC/ST/PwD candidates, there is a relaxation of 0.5 CPI or 5% of marks.
2. Students for admission into the Ph.D. Programs in Science departments must have a Master degree in the relevant discipline with a GATE / UGC / CSIR / NBHM / NET score/ Appropriate National Level Examination (Centralized test) for admission with a minimum CPI of 6.5 (on a 10 point scale)or equivalent (60% of marks).For SC/ST/PwD candidates, a minimum CPI of 6.0 (on a 10 point scale) or equivalent (55% of marks) with a GATE / UGC / CSIR / NBHM / NET score / Appropriate National Level examination (Centralized test) score is required for admission.

3. Students for admission into the Ph.D. Programs in Department of Management Studies must have a Master's degree in Business Administration or Master's degree in Engineering/Technology with a minimum CPI of 6.5 (on a 10 point scale) or equivalent (60% of marks) or Master degree in other disciplines with a minimum CPI of 6.5 (on a 10 point scale) or equivalent (60% of marks). For SC/ST/ PwD candidates, a minimum CPI of 6.0 (on a 10 point scale) or equivalent (55% of marks) is required. A score in NET /GATE/UGC/ Appropriate National Level Examination (Centralized test) is required for all.
4. Students for admission into the Ph.D. Programs in Department of Humanities and Social Sciences (HSS) must have a Master's degree in any relevant field with a minimum CPI of 6.5 (on a 10 point scale) or equivalent (60 % of marks) or Master degree in other disciplines with a minimum CPI of 6.5 (on a 10 point scale) or equivalent (60 % of marks). For SC / ST/ PwD candidates, a minimum CPI of 6.0 (on a 10 point scale) or equivalent (55 % of marks) is required. A score in NET/GATE /UGC/ Appropriate National Level Examination (Centralized test) is required for all.

GROUP B: Ph.D. Program–No financial assistance or stipend by NIT Silchar will be provided for this GROUP.

Following students will be considered under this GROUP:

I) Regular – The regular students are those who work full-time for their Ph.D. and self - financed.

II) Sponsored – who are employed in a Central/ State Govt. Departments /PSUs /Reputed Educational Institutes/ Research organizations/ Reputed Industries for doing research in the Institute on a full-time basis. He/ She should have at least two years of working experience in the respective field. The candidate must submit the filled-in sponsorship letter (FORM I) from the employer with the application for admission. He / She shall not be entitled to any financial support from the Institute.

III) Part-Time – This category refers to the candidates who are professionally employed personnel. They have to stay in the Institute/around the Institute at least during the period of course work so that they can attend regular classes as per the Institute academic norm. The applicant must be an employee of a State/Central Govt. Departments/ PSUs/Reputed Educational Institutes/Research organizations/ Reputed Industries at the time of admission having at least one year experience in the discipline in which admission is sought. No financial assistance shall be provided by the Institute to such students. A No Objection Certificate from the Head of the Institute/Organization, in which he/she is employed, must been closed with application in FORM II-A.

IV) Institute Employees – Employees of NIT Silchar. A No Objection Certificate from the concerned Head of the Department and the Director must be enclosed with application form (FORM II-B).

V) Project Staff – This category refers to the candidates who work on sponsored projects in the Institute. A No Objection Certificate from the Principal Investigator of the concerned project and Dean(R &C) must be enclosed with application form (FORM III).

VI) Sponsored (External Registration) – Candidates employed in R&D organizations/educational Institutes having adequate research facilities. Sponsorship certificate (FORM IV) from the Head of the organization where the candidate is employed must be enclosed at the time of application.

Eligibility for application in GROUP B:

1. Students for admission into Ph.D. Programs in Engineering Departments must satisfy one of the following criteria:

   M.E. / M.Tech. or equivalent in an appropriate area with a minimum CPI of 6.5 (on a 10 point scale) or equivalent (60% of marks). For SC/ST/PwD candidates, a minimum CPI of 6.0 (on a 10 point scale) or equivalent (55% of marks).
2. Students for admission into the Ph.D. Programs in Science departments must have a Master degree in the relevant discipline with a minimum CPI of 6.5 (on a 10 point scale) or equivalent (60% of marks). For SC/ST/PwD candidates, a minimum CPI of 6.0 (on a 10 point scale) or equivalent (55% of marks) is required.
3. Students for admission into the Ph.D. Programs in Department of Management Studies must have a Master's degree in Business Administration or Master's degree in relevant disciplines with a minimum CPI of 6.5 (on a 10 point scale) or equivalent (60% of marks). For SC/ST/ PwD candidates, a minimum CPI of 6.0 (on a 10 point scale) or equivalent (55% of marks) is required.
4. Students for admission into the Ph.D. Programs in Department of Humanities and Social Sciences (HSS) must have a Master's degree in relevant field with a minimum CPI of 6.5 (on a 10 point scale) or equivalent (60 % of marks). For SC / ST/ PwD candidates, a minimum CPI of 6.0 (on a 10 point scale) or equivalent (55 % of marks) is required

APPLICATION PROCEDURE

The applicants can apply for the PhD program through the online application portal available at http://admission.nits.ac.in/phdadmission2025/

An Application Fee of **Rs. 1000**/-(for Open/OBC) **OR Rs. 500/-** (for SC/ST/ PwD/EWS) must be paid via online payment and steps for online payment is as follows:

1. www.onlinesbi.sbi
2. State Bank Collect (SB Collect).
3. Accept and proceed.
4. State of Institute>Assam.
5. Type of Institute> Educational institute> Go.
6. Educational Institutions Name>Select online fee collection account NIT Silchar>Submit.

7. Select payment category as “Application fee for PhD Admission 2025”.
8. Fill the required information and submit.

The payment reference number and date of the payment to be mentioned in the online application form, otherwise the application form will be treated as cancelled.

The applicant must upload all relevant self-attested documents, in connection with the credentials claimed by the applicant in pdf format along with the scanned signed copy of the Declaration form at the time of filling up of application form.

The final pdf copy of the Application form must be emailed to **phd_admission@nits.ac.in** **on or before 27th December 2024. Subject line should be “Application for Ph.D. program- *Name of the department (applying for)-Group A /Group B*”. No need to send the hard copy of the Application form.**

The candidates are advised to give their latest contact numbers/e-mail ids in the application form. The Institute reserves the right to reject any or all applications or it may amend any of the clauses above as per orders of the competent authority/Government of India.

The result will be available in the website.

Important Dates:

(i)	**Last date of submission of form to the Institute:**	**27.12.2024**
(ii)	**Tentative date of publication of Shortlisted candidate for interview & written test**	**01.01.2025**
(iii)	**Tentative date of interview & written test by the department**	**08.01.2025**
(iv)	**Tentative date for list of recommended candidates for admission to be uploaded in the institute website:**	**14.01.2025**
(v)	**Date of Registration**	**14.01.2025 – 20.01.2025**

Selection Procedure:

Selection process will comprise of following steps:

- Shortlisting will be made by the department on the basis of relevant discipline and the appropriate weightage of marks obtained in Class X onwards.
- All the shortlisted candidates need to appear for a **Centralized written test** at NIT Silchar for the respective department as per the GATE/NET/UGC syllabus and subsequent interview.
- Mere qualifying the written test and the interview will not bestow confirmation of selection for the Ph.D. program at NIT Silchar for any candidate.
- However, the candidate who applied under the Group – A category with GATE/ NET/UGC qualifying examination score will be given appropriate weightage.

GENERAL TERMS AND CONDITIONS

1. The Institute reserves the right to cancel the candidature without assigning any reason thereof.

2. The prescribed qualification is minimum and mere possession of the same does not entitle candidates to be called for written test and interview.
3. No correspondence will be entertained from any candidates who have not been shortlisted for national-level written test.
4. Canvassing in any form will result in disqualification of candidature.
5. Legal disputes, if any, will be restricted within the jurisdiction of Silchar Court only.
6. Candidates should upload their application form along with all supporting documents duly self-attested.
7. All reserved category candidates shall be required to submit self-attested copies of the latest Caste certificate issued by competent authority.
8. Candidates must produce original mark sheets and certificates during document verification and at the time of counselling, if called for.
9. Candidates appearing for final year ME / M.Tech. / M Sc. / MA / MBA are also eligible to apply. However, their final result must be published on or before the final admission.
10. The date of counseling and document verification, upload of the list of provisionally selected candidates in the Institute website (including waitlisted candidates) and the period of Admission and Registration will be published at appropriate time in the institute website.
11. **Candidates are requested to check the institute website regularly for updates.**
12. Hostel accommodation is subject to availability.

OTHER IMPORTANT INFORMATION

1. Candidates are requested to provide their active email Id/ mobile phone numbers/ landline phone numbers in the application form for easy contact.
2. List of shortlisted candidates will be displayed on the Website of the Institute. No personal intimation will be made to the candidates. Candidates are advised to visit the Institute website regularly.

Sd/-

Dean (R&C)

Department wise area of research

Department	Arear of Research	Group
Civil Engineering	**Transportation Engineering:** Traffic Engineering, Traffic Safety, Transportation Planning, Travel Demand Forecasting, Pavement Design, Characterizing of Pavement Materials, Use of Waste Materials, Microstructural analysis, Asphalt mix, Intelligent Transportation Systems **Structural Engineering / Structural Dynamics & Earth quick Engg:** New Concrete Materials for Sustainable Infrastructure, Nanomaterials, Recycled Aggregate Concrete, Fiber Reinforced Concrete, Hybrid soil modeling; Base Isolation; FE Modeling of Dam, etc.; Liquefaction; Earthquake Early Warning; Machine Learning; Condition Assessment of Structure; App Development; Evaluation of relevant IS code; Geotechnical; Structure; Earthquake Engg., Risk and Resilience of Critical Infrastructure Systems, Physics informed Machine Learning in Structural Engineering, Structural Engineering, Composite Structures, GFRP Pultruded Profiles, Steel Structures, Lightweight structures, fire behaviour of structures, Timber and Bamboo-based Structures, Fracture Mechanics, Ground Response Analysis, Vibration Control of Structure using Passive system, Behaviour of Base Isolated building with new isolator, Risk and Reliability, Optimisation of Performance of Structure under uncertainty, Structural Health Monitoring, Vibration Control, Seismic Retrofit, Concrete technology, Structural Dynamics and Vibration Control, Functionally graded material and composite material, Machine learning in structural engineering, Turbulence modelling **Geotechnical Engineering:** Ground Improvement, Soil-Structure Interaction, Dynamics of Improved Soil, Dynamics of Foundations, Machine Foundations and Vibration Analysis, Transportation Geotechnics, Slope Stability Analysis, Analytical and Numerical Modeling in Geomechanics, Application of Image Processing in Geotechnical Engineering, Seismic Hazard Analysis, Liqufaction, Risk and Reliability in Geotechnical Engineering, Application of Artificial Intelligence and Machine Learning in Geotechnical Engineering. **Water Resources Engineering / Environmental Engineering:** Hydrology & hydro-climatology, Homogeneous clustering, Climate change impact assessment, Downscaling of climate variables and Uncertainty quantification, River modelling studies, Sediment analysis in river flow, micro plastic analysis, Coastal Engineering, Remote Sensing and GIS applications, Offshore Engineering, Water and wastewater treatment, Industrial waste management, Adsorption, River health monitoring, analytical chemistry, catalysis, biopolymers.”	**A & B**

Computer Science and Engineering	Machine learning, Deep Learning, Audio Visual Recognition, Healthcare computing Natural Language Processing, Machine Learning, Quantum Computing, Deep Learning, Social Network Analysis Lattice-based cryptography, Homomorphic encryption Security, Cryptography and Data Structure (Bloom Filter) Image Hashing, Image Zero-Watermarking, and Video Shot Boundary Detection Quantum computing Computer Network Communications, Optical/Wireless Networks, Wi-Fi 6/6E/7, 5G/6G, Hetnets, Scheduling, Resource allocation, Optimization (Classical/Heuristic/ML) Bioinformatics and Computational Biology Computer Vision, Image Processing, NLP, HAR using Mobile Sensor Data and ML/DL Biometric Security, Pattern Recognition, Computer Vision	**A**
	Machine learning, Deep Learning, Audio Visual Recognition, Healthcare computing Natural Language Processing, Machine Learning, Quantum Computing, Deep Learning, Social Network Analysis Computer Network Communications, Optical/Wireless Networks, Wi-Fi 6/6E/7, 5G/6G, Hetnets, Scheduling, Resource allocation, Optimization (Classical/Heuristic/ML) Bioinformatics and Computational Biology Biometric Security, Pattern Recognition, Computer Vision	**B**

Electronics & Communication Engineering	Micro/Nano electronics: Semiconductor device and Modelling, MOS physics and modeling, Micro/Nano electronics: Compact Modeling of HEMT; Nanotechnology: III-V Nanowire LED; Energy Harvesting: Perovskite Solar Photovoltaics; Renewable Energy, Li-Ion Battery, Organic Electronic Devices and Photodetectors; deposition techniques, Thin Films and device Characterizations, SPICE/Compact modeling of Multigate FETs, TCAD Simulation of nanoscale and emerging transistor architectures, Computational Nano electronics/Quantum modeling, Statistical analysis of Reliability issues/Self-heating/Stress, Machine learning based device modeling, Non-volatile memory/RRAM/SRAM/Memristor, Neuromorphic computing, MEMS/NEMS, RF MEMS, BioMEMS, Optical MEMS, MEMS Sensors, Actuators, Lab on Chip, Organ on Chip, Optimization, Semiconductor Devices modelling and simulation, Photonic Biosensors, Gas sensor, Group III-V Materials VLSI Design: Digital VLSI design, Analog VLSI design, Analog and Mixed Style VLSI Design, Algorithms to VLSI Architectures, VLSI Testing and verification, Optimizations, VLSI Interconnects, Stretchable electronics Wireless Communication, Cognitive Radio Networks, UAV based Communication and networking in C-RAN, Resource Allocation in 5G, Energy Harvesting protocols, Network Slicing, Caching and Splitting of network function in 5G, Satellite Communications, Wireless Sensor Networks, Communication Systems, Millimeter Wave Communications, Digital Communication, Information Theory and Coding, Signals and System, Satellite Communication, Mobile Communication and Wireless Networks, Underwater Networks, Free Space Optical Communications and Green Communications, Massive / Cooperative MIMO, NOMA, Power Line Communications, Smart Grid, IoT, Artificial Intelligence, Convex Optimization, 5G Networks, Next Generation Wireless Networks, UAV-assisted Networks, 5G Communication Techniques, Cooperative Communications), Soft Computing Techniques, Smart Grid Communications, Energy efficient, NOMA, MIMO-OFDM Communications, IoT, Efficient scheduling of wireless resources, and various aspects of all other recent forms of communications, Physical Layer Security, Cooperative Communications, 5G Techniques, Optical Fibre Communication. Signal processing, Speech Processing, Image and Video Processing, Bio-medical Signal and Image Processing, Machine Learning, Soft Computing Techniques, Communication Engineering and the other areas related to Signal Processing, Multimedia authentication, Computer Vision, Medical Imaging, Neuroimaging, Pattern Recognition, Optimization Techniques, Signal Processing for Communication. RF Energy Harvesting Systems, Dielectric Resonators and Applications, EBG and FSS Structures, Antennas for 5G Communications, Computational Intelligence Applications in Microwave and Millimeter Wave Engineering, Antenna Design, Metamaterial, WBAN, Flexible Antennas, Antenna Array Optimization, Resonators for RF Applications, Metamaterial-Inspired Structures for Antenna Application, Soft Computing Techniques in WSNs, Wearable antenna, MIMO antenna, Metamaterial antenna, Machine Learning for	**A & B**

	Microwave & mm-Wave Devices, Microwave Imaging, RADAR Signal Processing, Metamaterials for mm-wave Structures, Active and Passive Microwave Devices, Microwave Imaging, Smart Antenna Systems, Cyber Security.	
Electrical Engineering	**Power and Energy Systems** Electric Vehicle Route Planning using Machine Learning , Aging assessment for Battery Energy Storage System in Electric Vehicles, . Intelligent Control of Electric Vehicles, Mathematical Modelling of Motors for Electric Vehicles, Scheduling of electric vehicles in residential distribution network. Automatic generation control, Microgrid, Power system operation and control, application of soft computing techniques in power systems, Power quality, Machine learning for power system and micro grid, Machine Learning, Micro-grid Operation and Management, Renewable Energy and Energy Market, Assessment of Reactive Power Reserve and Pricing, Optimal Sizing of Microgrid Components in Off-grid applications. Energy Forecasting & Pricing, Single and Multi-Objective Optimization and application in Power systems, Meta-heuristic Algorithms, Distributed Generation Electric Power Distribution systems, Distribution network operation and planning, Optimal Power Flow in Power Systems, Application of Soft Computing Techniques, Energy Management in Microgrid , Power Quality control in Microgrids, Optimal Sizing of Microgrid Components in Off-grid applications. Application of Bio-inspired/Metaheuristic optimization techniques for Energy Management of Microgrids, Smart Grids and Electrical Vehicles. Design of Current Sensors for Phasor Measurement Units and their applications in Power systems operation and control. Mitigation of Sub synchronous Resonance with STATCOM, SSSC and UPFC using PI and FOPI controllers. Power System Flexibility, Power System Security, Deregulated power system, Renewable Generation Forecasting, Load Forecasting, Smart Grid Protection, Wide-Area Monitoring and Control, Big Data Analytics, Cyber Security, Distribution System Optimisation, Virtual Power Plant. Fault Detection, Classification & Location Estimation, Wide area back-up protection, HVDC Protection, Protection of Series-Compensated Transmission System. Hydro Power Plants, Applications of machine learning techniques in Electrical Engineering. Renewable Energy Sources and Restructured Power System. Power electronics application in renewable energy, Renewable Energy Technologies, Renewable Integration, Distributed Generation, Application of Soft Computing Techniques. **Control Systems:** Control System, network control, model order reduction and control application in power electronics and energy systems, Modelling and control of robotic systems, Robust Control, adaptive control, Optimal control, Nonlinear and Fractional Order Control, Quantitative feedback theory based Control System: Design and application,	**A**

	Sliding Mode control, Control of nonlinear system, Dissipative and Passivity based controller design, Water Quality Control, Variable order dynamics Mathematical Control (includes robust, adaptive and optimal control), Application of control theories for -- Power & Energy System Problems, Robotics, Biomedical Systems, System Theory development for Behavioural and Psychological models (Transdisciplinary research in collaboration with social & psychological sciences), NN based embedded adaptive control system with wireless communication. Design and development of Underwater Autonomous Vehicles, their control and applications, Advanced Battery Management System of electrical vehicles to overcome sudden explosion of batteries, Nonlinear dynamics and chaos, their control with advanced nonlinear controllers and applications, including secured communications, Design and development of a mobile application to measure the correctness of Pranayam in terms of number/ sec and postures and suggest corrections, Design and development of a solar-based trimming of lawns and trimming of bushes (next phase will be autonomous) for a 5000 + population campus, Design and development of a solar-based road cleaner along with bruising (next phase will be autonomous) for a 5000 + population campus, Designing an awareness program on cybersecurity for common people, Develop a unified criterion for using blockchain technologies to satisfy cybersecurity properties , Stability analysis of networked-isolated micro-grids in the presence of source, load disturbances and faults, Design, develop and control drones for different societal applications. **Power Electronics and Drives:** Electric vehicle, Design and development of power converters/inverters and its application in renewable energy sources, DC- DC converter, High gain converter, Grid connected photovoltaic system, Multilevel systems, Power quality issues, AC–DC microgrids, Distributed and coordinated control of microgrid Mathematical Modeling of Motors for Electric Vehicles, Charging Infrastructure planning for Electric Vehicles, Electric Vehicle Route Planning using Machine Learning, Aging assessment for Battery Energy Storage System in Electric Vehicles, Power Electronics applications to Electric Power and Energy Systems, Power Electronics Electrical Machines and Drives, AC Drives for marine propulsion Electric Vehicle Condition Health Monitoring and Fault Diagnosis of Electrical Machines, Power Electronics Converters related to EV Applications, Low Power Switched Capacitor Converters, Batteries and Capacitors. Grid interactive and isolated Renewable Energy Systems and Control (Wind, SPV, Hybrid); Microgrid Control (Power Management, Power Quality, and Transient Issues); Power Conditioning of Power Distribution Systems using Active Filters (Shunt/ Series/ Combined/ Hybrid); Multifunctional and Flexible Power Converters and its applications; Power Converters applications in Electric Vehicles; Electric Drives; Smart Grid Power Management and Control.	

	Building Integrated Photovoltaic (BIPV) & Photovoltaic (PV) Generation, Partial Shading in BIPV, Building Applied PV (BAPV) & PV Arrays, Solar Array Configurations & Reconfigurations, Global Maximum Power Point (GMPP) Enhancement & Extraction in Solar Arrays, Building to Grid (B2G) & Grid to Building (G2B), Floating Solar Photovoltaic (FSPV) & Agro photovoltaic (APV) **VLSI and Image Processing:** Brainwaves analysis using intelligent techniques. Semiconductor Devices: Modelling and Simulation, MOSFET, GAAFET, TFET devices, Low Power VLSI Design, Embedded Systems and Applications, IOT applications, Nanomaterials: DFT based study and characterization, Nanoelectronics and Nanotechnology-CNTFET, Nanowire FET Devices and circuits , Signal Processing, Intelligent Instrumentation, Computer Vision, Image Processing and Applications: Image segmentation, multilevel thresholding, Image quality, Image classifications, Applications of Image processing in Agriculture, Medical Sciences 8. VLSI for Image Processing, Instrumentation and, Sensors and Actuators, Embedded System Design and Programming, Numerical Linear Algebra, Digital Image Processing, Machine Learning. Low Power Electronics converter based VLSI design. Study and Analysis of Autism Spectral Disorder **High Voltage Engineering** High voltage applications, High Voltage Engineering and Testing, Design of Lithium-ion Batteries, Insulation Design and Diagnosis of Electric Vehicles, New Insulation Materials for AC and DC Cables, Power Electronics Packaging.	
	Power and Energy Systems Electric Vehicle Route Planning using Machine Learning , Aging assessment for Battery Energy Storage System in Electric Vehicles. Intelligent Control of Electric Vehicles, Mathematical Modelling of Motors for Electric Vehicles, Scheduling of electric vehicles in residential distribution network. Automatic generation control, Microgrid, Power system operation and control, application of soft computing techniques in power systems, Power quality, Machine learning for power system and micro grid, Machine Learning, Micro-grid Operation and Management, Renewable Energy and Energy Market, Assessment of Reactive Power Reserve and Pricing, Optimal Sizing of Microgrid Components in Off-grid applications. Energy Forecasting & Pricing, Single and Multi-Objective Optimization and application in Power systems, Meta-heuristic Algorithms, Distributed Generation Electric Power Distribution systems, Distribution network operation and planning, Optimal Power Flow in Power Systems, Application of Soft Computing Techniques, Energy Management in Microgrid, Power Quality control in Microgrids, Optimal Sizing of Microgrid Components in Off-grid applications. Power System Flexibility, Power System Security, Deregulated power system, Renewable Generation Forecasting, Load Forecasting, and Virtual Power Plant.	**B**

	Fault Detection, Classification & Location Estimation, Wide area back-up protection, HVDC Protection, Protection of Series-Compensated Transmission System. Applications of machine learning techniques in Electrical Engineering. Renewable Energy Sources and Restructured Power System. Power electronics application in renewable energy, Renewable Energy Technologies, Renewable Integration, Distributed Generation, and Application of Soft Computing Techniques. **Control Systems:** Control System, network control, model order reduction and control application in power electronics and energy systems, Modelling and control of robotic systems, Robust Control, adaptive control, Optimal control, Nonlinear and Fractional Order Control, Quantitative feedback theory based Control System: Design and application, Sliding Mode control, Control of nonlinear system, Dissipative and Passivity based controller design, Water Quality Control, Variable order dynamics Bilateral and multilateral robotic tele-operation as applied in space robotics, rehabilitation, remote surgery and hazardous material handling, Application of AI/ML for biomedical and rehabilitation systems (Product and patent oriented focus) with emphasis on either signal/image/data driven approach. Design and development of Underwater Autonomous Vehicles, their control and applications, Advanced Battery Management System of electrical vehicles to overcome sudden explosion of batteries, Nonlinear dynamics and chaos, their control with advanced nonlinear controllers and applications, including secured communications, Design and development of a mobile application to measure the correctness of Pranayam in terms of number/ sec and postures and suggest corrections, Design and development of a solar-based trimming of lawns and trimming of bushes (next phase will be autonomous) for a 5000 + population campus, Design and development of a solar-based road cleaner along with bruising (next phase will be autonomous) for a 5000 + population campus, Designing an awareness program on cybersecurity for common people, Develop a unified criterion for using blockchain technologies to satisfy cybersecurity properties, Stability analysis of networked-isolated micro-grids in the presence of source, load disturbances and faults, Design, develop and control drones for different societal applications. **Power Electronics and Drives:** Electric vehicle, Design and development of power converters/inverters and its application in renewable energy sources, DC- DC converter, High gain converter, Grid connected photovoltaic system, multilevel systems, Power quality issues, AC–DC microgrids, Distributed and coordinated control of microgrid Mathematical Modeling of Motors for Electric Vehicles, Charging Infrastructure planning for Electric Vehicles, Electric Vehicle Route Planning using Machine Learning, Aging assessment for Battery Energy Storage System in Electric Vehicles, Power Electronics	

	applications to Electric Power and Energy Systems, Power Electronics Electrical Machines and Drives, AC Drives for marine propulsion Electric Vehicle Condition Health Monitoring and Fault Diagnosis of Electrical Machines, Power Electronics Converters related to EV Applications. Grid interactive and isolated Renewable Energy Systems and Control (Wind, SPV, Hybrid); Microgrid Control (Power Management, Power Quality, and Transient Issues); Power Conditioning of Power Distribution Systems using Active Filters (Shunt/ Series/ Combined/ Hybrid); Multifunctional and Flexible Power Converters and its applications; Power Converters applications in Electric Vehicles; Electric Drives; Smart Grid Power Management and Control Building Integrated Photovoltaic (BIPV) & Photovoltaic (PV) Generation, Partial Shading in BIPV, Building Applied PV (BAPV) & PV Arrays, Solar Array Configurations & Reconfigurations, Global Maximum Power Point (GMPP) Enhancement & Extraction in Solar Arrays, Building to Grid (B2G) & Grid to Building (G2B), Floating Solar Photovoltaic (FSPV) & Agro photovoltaic (APV) **VLSI and Image Processing:** Semiconductor Devices: Modelling and Simulation, MOSFET, GAAFET, TFET devices, Low Power VLSI Design, Embedded Systems and Applications , IOT applications , Nanomaterials: DFT based study and characterization, Nanoelectronics and Nanotechnology-CNTFET, Nanowire FET Devices and circuits , Signal Processing, Intelligent Instrumentation, Computer Vision, Image Processing and Applications: Image segmentation, multilevel thresholding, Image quality, Image classifications, Applications of Image processing in Agriculture, Medical Sciences, VLSI for Image Processing, Instrumentation and, Sensors and Actuators, Embedded System Design and Programming, Numerical Linear Algebra, Digital Image Processing, Machine Learning. Condition Monitoring of Biomedical Signals (ECG, EEG, PCG etc.), Anomaly Detection for Intelligent Transportation System using learning methods, Object Detection and Classification in Electrical Systems using AI techniques, Image restoration/ interpretation using sensor aided AI systems. **High Voltage Engineering** High voltage applications, High Voltage Engineering and Testing, Design of Lithium-ion Batteries, Insulation Design and Diagnosis of Electric Vehicles , New Insulation Materials for AC and DC Cables , Power Electronics Packaging , Electromagnetic Field Simulations.	

Electronics and Instrumentation Engineering	**Automation, Control, Robotics, and Systems:** Mathematical Modeling, Estimation, Simulation and Analysis. Robust Control, Adaptive Control, Optimal Control, Data-driven Control. Process Control. Robotics, Path Planning, Obstacle Avoidance. Cyber-physical Systems, Multi-agent Systems, Time-delay Systems. Digital-twin Technology. **Biomedical Instrumentation:** Human Cognition, Brain-computer Interface, Evoked Potentials. VR/AR in Biomedical Applications, Wearable Devices. Drug Delivery. Pain Measurement and Analysis, Music for Pain Therapy. Traditional and Indigenous Healing Methods. **Communication Systems:** 5G and Beyond Communication: V2X Communication, IRS, D2D, mmWave, Massive MIMO, NOMA. **Instrumentation:** Intelligent Instrumentation. Bio-sensor Development. Data-acquisition and Signal Conditioning. Low cost electrochemical impedance spectroscopy (EIS) measurement. **Instrumentation for societal needs:** Automation for Societal Needs. Biomedical Waste Disposer for Sanitary Napkin and Condom. Design and Development of Products. **Signal and Image Processing:** Signal & Image Processing for Engineering and Biomedical Applications. EIS information from on-board time domain data. **Renewable Energy Systems & Energy Storage:** Energy Storage (Battery, Supercapacitor, LIC). Energy Harvesters. Hydrogen Generation and Storage. Fuel Cells. Hybrid Renewable Energy Systems. Waste to Energy. Battery Management Systems. Condition Monitoring, Scheduling and Fault Diagnosis. **VLSI and Semiconductor Devices:** Digital VLSI. Semiconductor Devices. MEMS Devices, Nano-sensors. **AI, Analytics and Computation in Engineering:** (In all the above mentioned domains and subdomains.)	**A & B**
Mechanical Engineering	Green Hydrogen Production, Carbon Capture and Utilization (CCU),Synthetic Fuels (e-fuels), Waste to Energy, IC Engine Combustion, Biofuel, Energy Storage Technologies , Energy Harvesting, Computational fluid dynamics, Bio fluid dynamics and heat transfer, Magneto hydrodynamics, Microchannel flow, Porous media flows, Droplet dynamics, Microfluidics, Fabrication of microfluidic devices, Wettability, Multiphase flow, Non-Newtonian fluid mechanics, Instability analysis, Natural convection, Thermal protective clothing, Passive cooling methods, Boiling heat transfer, Heat transfer, Micro and macro scale heat transfer, Phase change materials and encapsulation technology, Atomization and spray, Solar Thermal Energy, Solar Passive heating systems, Machine learning based meta modeling of renewable energy systems Solar passive systems for net-zero building, HVAC and Building information modeling (BIM) for thermal performance management, Design and development of vertical axis wind turbines, Site and application specific tailoring of hybrid renewable energy systems, Battery, Fuel cell, Micro/Pico water turbines, Ocean Renewable Energy, Ocean Thermal Energy conversion, Wind Energy System,	**A**

	Performance study of Oscillating Water Column, Molecular Dynamics, Uncertainty Quantification, Digital Twin, Metamaterials, Development and Synthesis of polymer composites, Hybrid composite materials, Energy materials and management, Fatigue and fracture behaviour of materials, Machining of Composite materials, Hybrid multiscale laminated composites, Bio-composites, Self-healing composite materials and FRP laminates, Vitrimers, Thermoformable composites, Material Selection, Material Synthesis and Characterization, Metal Matrix Composites, Vibration and Rotordynamics, Vibration energy harvester, Biomedical system design and analysis, Design and control of micro and macro Mechatronics systems, Mechatronics systems and energy harvester, Analysis, design, and control of Mechatronics systems, Surface coatings, additive manufacturing, powder fabrication, Hydrophobic/hydrophilic coating, Robotics and control, Mechanism, Parallel Manipulator, Compliant Mechanism, Sensor and actuator, 3D printing mechanism, lower limb rehabilitation robotic devices, underwater robotic manipulator, Bionic Prosthesis, Mobile Robotic manipulator, Shape memory Alloy based soft robotics, Kinematics and dynamics of the robotic system, Planar and spatial parallel manipulators. Vehicle Manipulator Robotic System, Bioscience/ Biotechnology/ Bio-Mechanics, Modelling and development of Expert System for communicable and non-communicable diseases, Augmented/ virtual reality, AI / ML based Mechanical Design & Manufacturing, Composites / Functionally Graded Materials / Smart / Deployable structures, Additive Manufacturing, Tribology, 4D printing of SMP, Synthesis and Characterization of Metal Matrix Composites (MMC) through Powder Metallurgy (PM), Advanced (Non-traditional) Machining, Surface Modification through thin films Coating & Heat Treatment, Tribology of Bearing, Laser Welding, Laser Cladding, Application of Soft Computing Techniques in Manufacturing, Condition Monitoring, Thin Layer Deposition, Manufacturing Process Modelling & Optimization, Artificial Intelligence (AI) and Machine Learning (ML) Application in Manufacturing, Multi-criteria Decision Making (MCDM) Techniques, Welding Technology, Soft Computing, Fatigue & Fracture, Nontraditional Optimization Tools, Smart Adhesives and their joining, Surface engineering and functionalization, 3R Composites and vitrimers. Energy-efficient building materials, Vibration analysis, Machine Dynamics, Condition monitoring of dynamic system, Sustainable materials for coatings, Vibration isolation using additive manufacturing, Machine fault diagnosis and prognosis, Biomedical system design and analysis, Energy harvesters designed for biomedical applications, Machining, Electro-deposition, Product Development, Dissimilar welding of materials, Welding for Biodevices, Corrosion science, Thin film deposition, Sheet metal joining and riveting, Metal forming/Joining, Nano materials, Unconventional machining, Micromachining, Hydrophobic films and filtration membranes, Fabrication of Nanopowder for Additive manufacturing, Additive manufacturing of special structures and metal components, Graphene and coating-based sensors, Modeling of abrasive machining and finishing processes, Supersonic combustion, Scramjet, Turbulence modeling in high-	

	speed flows, Shock-Boundary Layer Interaction, Computational combustion, drag and heat reduction problem of hypersonic reentry vehicles, Aerodynamics, Computational Fluid Dynamics, Uncertainty Quantification, Metamaterials, Digital Manufacturing, Tribology of Bearings.	
	Green Hydrogen Production, Carbon Capture and Utilization (CCU),Synthetic Fuels (e-fuels), Waste to Energy, IC Engine Combustion, Energy Storage Technologies ,Molecular Dynamics, Uncertainty Quantification, Energy Harvesting, Digital Twin, Metamaterials, Machine learning based meta modeling of renewable energy systems Solar passive systems for net-zero building, Design and development of vertical axis wind turbines, Site and application specific tailoring of hybrid renewable energy systems, Development and Synthesis of polymer composites, Hybrid composite materials, Energy materials and management, Fatigue and fracture behaviour of materials, Phase change materials and encapsulation technology, Hybrid multiscale laminated composites, Bio-composites, Self-healing composite materials and FRP laminates, Vitrimers, Thermoformable composites, Application of MCDM techniques, Machining of Composite materials, Vibration and Rotor dynamics, Vibration energy harvester, Biomedical system design and analysis, Design and control of micro and macro Mechatronics systems, Surface coatings, additive manufacturing, powder fabrication, Hydrophobic/hydrophilic coating, Solar Thermal system, Energy storage, Robotics and control, Mechanism, Parallel Manipulator, Compliant Mechanism, Sensor and actuator, 3D printing mechanism, lower limb rehabilitation robotic devices, underwater robotic manipulator, Mobile robotic manipulators, Supersonic combustion, Scramjet, Turbulence modeling in high-speed flows, Shock-Boundary Layer Interaction, Computational combustion, drag and heat reduction problem of hypersonic reentry vehicles, Aerodynamics, Computational Fluid Dynamics, Uncertainty Quantification, Metamaterials, Digital Manufacturing, Tribology of Bearings, Dissimilar welding of materials, Welding for Biodevices, Corrosion science, Thin film deposition, laser cladding, condition monitoring.	**B**

Chemistry	Photocatalytic and/ or catalytic applications of Graphitic carbon nitride and Hydroxyapatite based nanomaterials for environmental remediation and energy storage and harvesting. Nanoscience and Nanotechnology, Nano catalysts, Synthesis and application of inorganic nanostructured materials as catalysts, sorbents or polymer reinforcing nano-additives. Application of nanomaterials in various organic transformations, photo degradation of industrially emerging pollutants, bio-energy production and water treatment. Waste-derived catalysts for various organic transformations and photo degradation of emerging organic contaminants. Waste plastics recycling. Co-processing of petroleum vacuum residue, Polymers, Desulfurization, Solid waste Management, Multifunctional Porous Materials (Metal Organic Frameworks and Covalent Organic Frameworks) for Energy, Environment and Catalysis applications, Physical Chemistry. Organic synthesis, Synthesis of Schiff bases and Metal complexes, DFT and Biological studies. Organic Chemistry and Renewable Energy. Studying the photo physical and photochemical processes of organic fluorophores in homogeneous and heterogeneous environments using fluorescence spectroscopy; protein-ligand interaction. Transition metal complexes of nitrogen based heterocyclic ligands: Synthesis, properties and application. Organic Chemistry (Nano-structured materials for photo catalysis and medical/ bio-medical applications etc.); Environmental Waste Management (Applications of Nano-materials derived from solid-waste in Nano-electronics, Sensors, Nano-composite fillers etc.); Renewable (Biofuels) and Non-Renewable energy (Coal, and Petroleum). Computational chemistry, inorganic chemistry, structure, bonding, and reaction mechanism, aromaticity and electro catalysis. Supramolecular chemistry, organic-inorganic hybrid, metallosupramolecular polymers, aqueous self-assembly and co-assembly, pathway complexity, chiral supramolecular polymers and supramolecular electropolymerization.	**A & B**

Physics	**Experimental** Memristive Systems and Applications: II-VI semiconductor nanostructures for memory devices, Resistive Random access Memory, Nanoionics memristive systems, memristor based in-memory computing, Neuromorphic computing Energy Harvesting Materials and Applications: Perovskite for Solar Cell and energy harvesting (nano-generator), Solar Photovoltaics, Solar Energy Materials and Solar Photo catalysis Green Hydrogen Production: Solar photocatlytic hydrogen Production, Photocatalytic reactors for hydrogen generation, Solar photo electro chemical water splitting Solid state ionics: Cathode materials metal-air batteries, polymer electrolytes, proton exchange membrane (PEM) Multiferroics and Dielectrics: Multifunctional materials, Structural phase transitions in oxide perovskites, Ferroelectric material, Dielectric films for energy storage device, Dielectric resonator for mobile communication Nonlinear Optics: Crystal Growth , NLO Nanofibers **Theoretical** Quantum Materials: Quantum Anomaly in Topological Semimetals, Quantum Geometry induced Nonlinear Transport, Topological Superconductivity, Computational condensed matter physics Theoretical Physics: Theoretical High Energy Physics, Quantum Field Theories, String Theory and Quantum Gravity, Gauge/Gravity Duality, Black Hole Thermodynamics, General Theory of Relativity, and Cosmology, High energy phenomenology	**A & B**
Mathematics	Numerical methods to ODE and PDE, Operations research and optimization techniques, Computational Fluid Dynamics, Mathematical Modelling, Mathematical Modelling, Nonlinear dynamics, Dynamical system Theory, Complex Analysis, Number Theory and Cryptography, Complex Dynamics and Fractal Geometry, Linear Algebra and its applications, Operator Theory, Functional Analysis, Quantum Information Theory, Fuzzy set theory and application, Biomechanics, Wavelet Theory, Differential Equations, Boundary Value Problems, Fractional Differential Equations, Computational Fluid Dynamics, Micro-Nano Fluidic Modelling, Numerical methods for differential equations	**A**
	Operations research and optimization techniques, Biomechanics, Wavelet Theory	**B**

Humanities and Social Science	Macroeconomics, Financial Economics, Micro Economics, Environmental Economics, Agricultural Economics, and Behvioural Economics, Literary and Translation Studies, Colonialism and Colonial Modernity, Literary Historiography, Oral History, Sports Studies, 1947 Partition Studies, Eco-literature; Folklore Studies; Indigenous Studies.	**A & B**
Management Studies	Marketing Management, Sustainability, Innovation and Technology Management, Global Business and International Management, Neuromarketing, Marketing Analytics Financial Management, Behavioural Finance, Econometrics, Financial Accounting, FinTech, Financial Modelling, Financial Analytics, Portfolio Optimization Human Resource Management, Organisational Behaviour, Human Resource Analytics, Industrial Relations and Labour Laws General Management, Entrepreneurship, Strategic Management IPR Management and Commercialization, IP and Technology Transfer, IP in Digital & Internet Law, IP for Start Up and Entrepreneurship	**A & B**

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