

Department wise Specialization

1	Applied Geology: Coal Geology, Petroleum Geology, Geomorphology, Paleontology, Computational Geosciences, Geostatistics with Artificial Intelligence and Machine Learning, Carbonate Sedimentology, Economic Geology, Biogeochemistry, Environmental Geology, Medical Geology, Planetary Geology, Marine Geology, Mining Geology, Geodynamics
2	Applied Geophysics : Gravity, Magnetic, Geophysical Signal Processing/Inversion, Artificial Intelligence/Machine Learning and Deep Learning with Applications in Geophysics, Electrical/MT/Electromagnetic Methods, Exploration Seismic, Remote Sensing & GIS Applications, Well Logging/Rock Physics/Petrophysics, Marine Geophysical Exploration, Earth and Planetary Sciences, Atmospheric Sciences, Physical Oceanography and Application of Radiometric Method.
3	Chemistry & Chemical Biology: Physical Chemistry, Inorganic Chemistry and Organic Chemistry, Chemical Biology, Formulation and Drug Delivery, Bioinformatics, Proteomics and other 'omics' technologies.
4	Chemical Engineering: Molecular Simulations, Molecular Thermodynamics, Process Systems Engineering and control, Bioprocess Engineering and Biosystems Engineering, Biosensors, Green Energy, Process Safety and Hazard, Circular Economy, Electrochemical Processes, Transport Processes, Materials Science, Catalysis and Reaction Engineering, AI & ML for Chemical Engineering, Separation Processes, Colloids and Interfaces, Process Optimization
5	Civil Engineering Structural Engineering Specialization: Structural Engineering, Structural Dynamics & Earthquake Engineering, Structural Health Monitoring, Construction Materials & Other Related Areas. Geotechnical Engineering Specialization: Geotechnical Engineering, Geo-environmental Engineering, Rock Mechanics & Other Related Areas. Water Resources Engineering Specialization: Water Resources Engineering, Hydraulics, Reservoir Optimization, Environmental Modelling & Other Related Areas. Transportation Engineering Specialization: Pavement Engineering, Traffic Engineering, Transportation Planning & Other Related Areas.
6	Computer Science and Engineering: Artificial Intelligence, Big Data Analytics, Bioinformatics, Cloud/Fog Computing, Computer Architecture, Computer Networks, Wireless Networks, Databases / Distributed Databases, Data Mining, Embedded Systems, High Performance Computing, Image Processing, Computer Vision, Information Retrieval, Natural Language Processing, Blockchains, Distributed Computing, Information Security, Internet of Things, Language Processors/Compiler Design, Machine Learning, Principles of Programming Languages, Soft Computing/Optimization, Software Engineering, Theoretical Computer Science, Game Theory, VLSI Design, Quantum Computing
7	Electrical Engineering: Bioinformatics, Biomedical Engineering, Control, Instrumentation, Robotics, Electrical Vehicle Technology, Electrical Machines, Machines & Drives, Power Electronics, Power System, Renewable Energy, High Voltage Engineering.
8	Electronics Engineering: Quantum Technology; ASIC design; High speed interconnects; Integrated circuits and systems design; Electronics System Design; VLSI Packaging; Emerging memory devices and technology; RF circuits & system design, EMI/EMC, RADAR, Microwave devices & system design, Microwave Imaging, Bio-electromagnetics, Antenna on Chip, RF/Optical signal processing, THz Technology, High Power Microwave devices, 5G/6G Communication Systems, IoT and Embedded System Design, Statistical Signal Processing, Deep Learning & Artificial intelligence, Integrated Photonics, Optical Communication, Electronic/ Photonic Materials Engineering.
9	Environmental Science & Engineering: Air Pollution, Atmospheric Science & Climate Change, Watershed Management, Natural Resource Management, Environmental Modelling, Environmental Economics, Environmental Sociology, Environmental Sustainability, Environmental Policy Research, Occupational Health & Safety, Noise & Vibration, Forestry,

	Wildlife Conservation & Management, Remote Sensing & GIS, Environmental Biotechnology, Environmental Geology.
10	Fuel, Minerals and Metallurgical Engineering Fuel & Energy Engineering: Combustion, gasification, pyrolysis and their modelling, Syngas utilization in thermal and metallurgical applications; Coke making from Indigenous coal, Processing and utilization of biomass and MSW, Pathways for H ₂ production, Storage, utilization and transportation, Energy storage, CO ₂ sequestration and utilization. Mineral Engineering: Mineral characterization and Processing, Physical Separation Process, Size Separation Process, Surface Chemistry and Flotation, Fine Particle Processing, Dewatering and drying, Coal Preparation, Plant Design, Process Control and Instrumentation, Critical Mineral Beneficiation, Processing of Industrial waste, E-waste, Lean grade ore, Industrial minerals, Rare Earth Elements, Modeling Metallurgical Engineering: Advanced Phase Transformation, Electrochemistry and Corrosion, Physical Metallurgy, Metallurgical Thermodynamics and Kinetics, Transport Phenomena, Advanced Materials Characterization, Ferrous & Non-Ferrous Extractive Metallurgy, Iron Making & Steel Making, Industrial Waste Utilization, Molten Salt Extraction.
11	Humanities and Social Sciences: Philosophy, English – Language and Literature, Psychology, Sociology, Economics, Digital Humanities, Political Science, History, Anthropology, Sanskrit, Fine Arts.
12	Mathematics & Computing Pure Mathematics: Combinatorics, Geometry (Algebraic, Differential), Algebra, Complex Analysis, Number Theory, Algebraic Topology, Representation Theory Applied Mathematics: Theoretical PDE, Computational Fluid Dynamics, Scientific Computing, Numerical Analysis, Mechanics, Dynamical Systems Theory Operations Research and Statistics: Operations Research (Industrial and Combinatorial Optimization), Control Theory, Stochastic Process, Design of Experiments, Financial Mathematics and Actuarial Science, Econometrics Theoretical Computer Science and Data Science: Machine Learning, Artificial Intelligence, Algorithms: Design & Analysis, Compiler Design, Operating Systems, DBMS, Cryptography, Bioinformatics, Data Mining, Sports Analytics, Big Data Analytics, Health Analytics, Computer Vision, Natural Language Processing, Parallel Computing, Quantum Computing, IoT
13	Managements Studies Organizational Behaviour & Human Resource Management: HR Analytics, Organizational Development & Change Management, Industrial Relations, Human Resource Development, Organizational Theory. Business Analytics: Information Systems, Data Mining, Big Data, Machine Learning. Finance and Accounting: Financial Analytics, Crypto currency, Quantitative Finance, Behavioural Finance. Industrial Engineering: Systems Engineering, Technology Management, Reliability & Safety. Marketing Management: Marketing Analytics, Digital Marketing, Neuro Marketing. Entrepreneurship & Innovation Management.
14	Mechanical Engineering Design Domain: Robotics, Multibody & Non-linear Dynamics, Intelligent control and mechatronics, Vibration (Non-linear and Random), Technical Acoustics, Multi-scale material modelling, Computer-aided-Design, Fracture and Impact Mechanics, Bio-mechanics, Vehicle Dynamics, Experimental Mechanics, Tribology, Mechanical System Design, Aerospace structural design, computational mechanics. Manufacturing Domain: Smart Manufacturing and Industry 4.0:- cyber-physical systems, IoT, machine learning, automation, robotics and data analytics as applied to manufacturing processes. Sustainable Manufacturing: Areas of expertise such as green manufacturing, circular economy principles, and energy-efficient production methods with emphasis on sustainability. Artificial Intelligence in Manufacturing: AI-driven process optimization, predictive maintenance, and autonomous systems. Precision Manufacturing: Micro and nano-scale manufacturing including

	advanced machining, laser / waterjet assisted manufacturing, and ultra-precision processes. Simulation and modelling. Advanced Manufacturing Systems Design: integrated manufacturing systems with a focus on flexibility, adaptability, and efficiency. Metal forming, Metal casting and welding. Modelling of Manufacturing processes: Analytical and FE, Surface engineering and tribology.
15	Mining Engineering: Mine Ventilation, Mine Environmental Engineering, Mine Safety Health and Ergonomics, Mine Planning and Economics, Mine Digitalization and Automation, Mining Machinery, Rock Excavation Engineering, Mining Methods, Mine Surveying and Geomatics
16	Petroleum Engineering: Petroleum Drilling Technology, Production Engineering, Reservoir Engineering, Unconventional Resources including CBM/Shale Gas/Gas Hydrate/Underground Coal Gasification/ Geothermal Energy/Hydrocarbon Storage & Transportation/CCUS
17	Physics: Astrochemistry / Astrobiology / Nuclear Astrophysics; Atomic and molecular physics / spectroscopy; Biophysics / Biotechnology / Medical Physics / Soft and Living Matter; Condensed Matter Physics; Energy Storage and Renewable Energy; Gravitational Waves Astronomy; High Energy Physics; Laser / Plasma Physics / Light Matter Interactions / Ultrafast Science; Low Temperature Physics; Materials Science / Semiconductor Technology / Nanomaterials; Nuclear Physics / Particle Physics; Quantum Information and Computation: Theory / Experiment; Quantum Minerals / Materials / Devices