

## Department wise Specialization

1	<b>Applied Geology:</b> Coal Geology and Organic Petrology, Hydrogeology, Geostatistics, Subsurface Seismic imaging and Bore hole geophysical logging, Artificial Intelligence and Machine Learning in Earth Sciences
2	<b>Applied Geophysics :</b> Gravity Methods, Magnetic Methods, Geophysical Signal Processing, Seismic Exploration, Radiometric Methods, Well Logging, Electrical Methods, Remote Sensing & GIS Applications, Seismology, Rock Physics, Petrophysics, Marine Geophysical Exploration, Earth and Planetary Sciences, Atmospheric Sciences, Physical Oceanography, Advanced Numerical and Finite Element Analysis with Applications in Geophysics, and Artificial Intelligence, Machine Learning and Deep Learning with Applications in Geophysics.
3	<b>Chemistry &amp; Chemical Biology:</b> Chemical Biology/ Bioinformatics/ Biochemistry/Organic Chemistry Pharmaceutical Chemistry. Chemical Biology/Biochemistry/Organic Chemistry/Inorganic Chemistry/Physical Chemistry/Materials Chemistry/Theoretical Chemistry/Computational Chemistry /Bioinformatics/Medicinal Chemistry
4	<b>Chemical Engineering:</b> Molecular Dynamics Simulation/Molecular Thermodynamics, Process System Engineering, Multi-Phase Systems in Chemical Engineering, Microfluidics and CFD, Complex fluids and Soft Matter, Nano and Advanced Functional Materials, Energy Storage Devices, Sustainable Energy, Bioprocess Engineering and Biosystems Engineering, Petroleum Refining/ Petrochemicals/ Polymer Engineering, Carbon Capture Conversion Utilization, Electrochemical Engineering, Membrane Science & Engineering, Industrial Safety and Hazard.
5	<b>Civil Engineering: Transportation Engineering Specialization:</b> Pavement Engineering, Pavement Management System, Infrastructure Planning and Design <b>Geotechnical Engineering Specialization:</b> Rock and Tunnel Engineering, Unsaturated Soil Mechanics, Constitutive Modeling <b>Structural Engineering Specialization:</b> Structural Health Monitoring, <b>Water Resources Engineering Specialization:</b> Computational Fluid Dynamics, Surface Water Hydrology, Water Resources Planning and Management
6	<b>Computer Science and Engineering:</b> High Performance Computer Architecture, Natural Language Processing, Internet of Things, VLSI Design and Testing, Interactive Computer, Graphics, Data Analytics, Bioinformatics, Cloud Computing, Evolutionary Computation, Embedded Systems, Complexity Theory, Formal Methods, Social Networking, Machine Learning
7	<b>Electrical Engineering:</b> B-Tech degree in Electrical Engineering or Equivalent of Electrical Engineering or in Electrical & Electronics Engineering: Measurement, Instrumentation, Control systems, Electrical Machines, Power systems, Electrical Drives, Power Electronics, High Voltage, Energy Systems, Electronic Devices, Micro Electronics, Photonics & Opto Electronics, Signal Processing & Any other subjects relevant to Electrical Engineering.
8	<b>Electronics Engineering:</b> RF circuits and devices, Terahertz technology, Radar and remote sensing, Computer vision and image processing, Information theory and channel coding, Internet of things, Optical signal Processing, Free space optical communication, Quantum information and computing, VLSI signal Processing, Neuromorphic computing, VLSI architecture, Fabrication of Nano devices
9	<b>Environmental Science &amp; Engineering:</b> Bachelors in any Engineering with Masters in Environmental / Atmospheric Sciences / Civil / Soil and Water / Chemical / Mechanical / Mining / Ocean / Remote Sensing & GIS / Biotechnology Engineering OR M.Sc. / M.A.

	in Environmental Sciences / Environmental Economics / Environmental Sociology / Environmental Sustainability / Environmental Management / Environmental Policy / Forestry / Atmospheric Sciences / Oceanography / Wildlife / Life Sciences / Biotechnology / Geology / Microbiology / Remote Sensing & GIS AND PhD with specialization in Air Pollution Control & Design, Atmospheric Science & Climate Change, Meteorology, Weather Research and Forecasting, Hydroclimatology, Watershed Hydrology, Applications of Machine Learning in Natural Resource Management, Environmental Modeling, Environmental Economics, Environmental Sociology, Environmental Sustainability, Environmental Epidemiology, Environmental Science and Policy, Environmental Policy Research, Occupational Health & Safety, Noise & Vibration, Forestry, Forest for Rivers and Aquifers, Wildlife Conservation & Management, Ocean Management, Remote Sensing & GIS, Environmental Geotechnology, Environmental Geology, Water & Wastewater Engineering, Environmental Microbiology.
10	<b>Fuel and Mineral Engineering:</b> Corrosion and Electro-chemistry, Non ferrous extractive metallurgy, Sustainability/ Waste processing, Flotation, Process control, Mineral economics, Computational techniques and modelling in mineral processing / coal cleaning, Equipment design, Advanced characterization, Materials Handling utility systems, BioFuels, Pyrolysis, Combustion etc., Alternate use of Coal.
11	<b>Humanities and Social Sciences:</b> Literature, ELT, Philosophy (Logic and Critical thinking), Psychology, Sociology, Political Science, International Relations, Public Policy, Digital Humanities, Human Rights, Developmental Studies and Allied areas, Public Health/ Health Management.
12	<b>Mathematics &amp; Computing: Pure Mathematics:</b> Combinatorics, Geometry (Algebraic, Differential), Algebra, Analysis, Number Theory <b>Applied Mathematics:</b> Theoretical PDE, Computational Fluid Dynamics, Scientific Computing, Numerical Analysis, Solid and Fluid Mechanics <b>Operations Research and Statistics:</b> Operations Research (Industrial and Combinatorial Optimization), Stochastic Process, Design of Experiments, Financial Mathematics <b>Theoretical Computer Science and Data Science:</b> Machine Learning, Artificial Intelligence, Algorithms: Design & Analysis, Image Processing, Compiler Design, Operating Systems, DBMS, Cryptography, Bioinformatics, Data Mining, Sports Analytics, Video Analytics, Big Data Analytics, Health Analytics
13	<b>Managements Studies:</b> Marketing, Finance and Accounting, Economics & Business Environment, Decision Science, Organizational Behaviour & Human Resource Management, Operations & Supply Chain Management, Strategic Management, Public Policy, Business Communication and Business Laws, Information Technology and Systems, Business Analytics, IPR & Entrepreneurship
14	<b>Mechanical Engineering: Manufacturing :</b> Casting technology, Metal forming, Simulation and modelling of manufacturing processes, Abrasive machining, Automation and control in manufacturing, Additive Manufacturing, Bio manufacturing, Industry 4.0/Cyber Physical Systems, Smart manufacturing, Precision engineering, Statistical process and quality control. <b>Machine Design:</b> Robotics, Multibody & Non-linear Dynamics, Intelligent Control and Mechatronics, Vibration (Nonlinear and Random), Technical acoustics, Multi scale material modelling, Computer Aided Design, Fracture and Impact Mechanics, Bio-Mechanics, Vehicle Dynamics, Experimental Mechanics, Tribology <b>Thermal:</b> Experimental and Numerical Combustion, Advanced Heat Engines, Conventional and Non-Conventional Refrigeration, Renewable Energy, Experimental Fluid Mechanics, Bio-Fluid Mechanics and Heat Transfer

15	<b>Mining Engineering:</b> Underground metal mining methods, Underground coal mining methods, Mine Surveying, Geodesy and GNSS, Surface mining methods, Upcoming areas: Asteroid mining and Deep Sea mining, Mine economics, Mine automation, Mine safety, Rock Mechanics
16	<b>Petroleum Engineering:</b> PhD degree in Petroleum Engineering/Chemical Engineering/Mechanical Engineering with specialization in (a) Petroleum Engineering Drilling and Production, (b) Reservoir Characterization, (c) Hydraulic Fracturing, (d) Modeling, Simulation and Optimization of Petroleum Processes, (e) AI-ML in Petroleum Engineering, (f) CO <sub>2</sub> sequestration & Geothermal Energy, and (g) Unconventional energy resources (CBM, Gas Hydrates, etc.).
17	<b>Physics:</b> High Energy Physics, Astrophysics & Cosmology, Biophysics, Plasma Physics, Quantum Computation & Information