



Civil Engineering Department at IITRAM is well equipped with state-of-the-art facilities for cutting edge research in almost all major specializations of Civil Engineering. The specializations include water resources, structure and material, environmental, transportation and geotechnical engineering. The well qualified and experienced faculty members in the department are willing to share their expertise and guide motivated candidates aspiring to pursue doctoral research. The major thrust areas of **Research** offered by the department in various specializations are as under:

Transportation Engineering

- Pedestrian flow modelling
- Traffic flow modelling
- Traffic operation & management Simulation modelling
- Pavement management system
- Pavement materials and design

Hydraulics Engineering

- Computational hydraulics with free surface
- Turbulent fluid flow
- Sediment transport
- Applications of remote sensing in water resources engineering

Structural Engineering

- Small lateral vibrations
- Static stability analysis
- Dynamic stability analysis
- Flutter under follower loads
- Parametric resonance under pulsating loads
- No tension solids
- Fracture of ductile & quasi-brittle materials
- Multi-scale studies on fracture of composites and concrete
- Size effect studies in concrete
- Hydration modelling of cement paste
- Condition assessment of civil engineering structures

Environmental Engineering

- Aerosol and air quality
- Indoor air pollution
- Development of low cost instruments for monitoring of environmental parameters
- Development of environmental friendly construction materials
- Urban heat island

Geotechnical Engineering

- Physical modelling in Geotechniques
- Reinforced earth and Geosynthetics
- Ground improvement techniques
- Computational Geotechniques
- Reliability analysis
- Geotechnical instrumentation
- Soil-structure interaction

Basic Laboratory Facilities Available at IITRAM

The Civil Engineering Department at IITRAM with the aim to provide comprehensive practical exposure to the UG students, and to provide adequate and state-of-the-art research facilities to its PG and research students, has developed laboratory facilities in almost all major specializations of Civil Engineering. Following are the major laboratories that exist in the department:

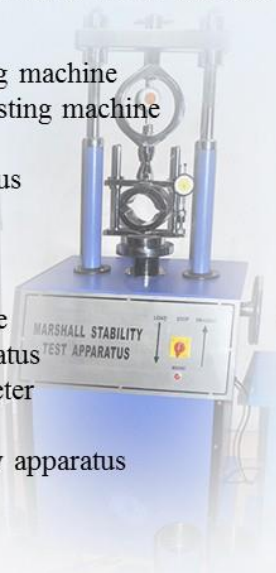
Soil Mechanics Laboratory: The purpose of Soil Mechanics lab is to determine physical, mechanical, hydraulic and chemical properties of earthen materials (soil/rock/composite material) which further help to predict field behavior, designing earthworks and foundation, evaluate stability of natural and manmade soil deposits, assess risk posed by site conditions and for forensic investigations.

1. Advanced triaxial testing system with accessories
2. Automatic sample extruder
3. Consolidation apparatus
4. Direct shear apparatus
5. Digital soil cone penetrometer
6. Vane shear apparatus
7. Motorized sieve shaker
8. Permeability apparatus
9. Indian standard and heavy compaction test
10. Field density using sand replacement and core cutter
11. Atterberg's limit devices
12. Hydrometer test with accessories
13. Universal data logger
14. Swell pressure apparatus
15. Relative density apparatus
16. Automatic compactor



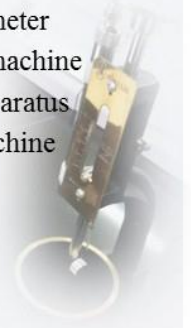
Transportation Engineering Laboratory: The major contribution of transportation engineering division is related to the wide spectrum of pavement & its material, design, performance and monitoring, for emerging urban needs & environmental problems. The laboratory equipped with instruments for testing of various road construction materials as under and still is in developing stage.

1. Aggregate impact testing machine
2. Los Angeles abrasion testing machine
3. Bulk density apparatus
4. Specific gravity apparatus
5. Shape test apparatus
6. Universal penetrometer
7. Ring and ball apparatus
8. Digital ductility machine
9. Pensky - Martens apparatus
10. Cannon-Fenske viscometer
11. Standard tar viscometer
12. Digital marshal stability apparatus
13. Centrifuge extractor
14. Benkelman beam
15. Radar gun
16. High speed digital camera



Construction Material Laboratory: A Civil Engineering graduate has to deal with various materials useful for construction of buildings, bridges, roads etc. Construction Material Laboratory, provides facilities to find out density, specific gravity, strength, ductility of various construction materials

1. Blain Air Permeability apparatus
2. Slump test
3. Le-Chatellier's apparatus
4. Rebound hammer
5. Ultra sonic pulse velocity tester
6. Rebar detector and cover meter
7. Aggregate impact testing machine
8. Compacting factor test apparatus
9. Cement cube vibrating machine
10. Platform vibrator
11. Vicat's apparatus



Environmental Engineering Laboratory: To impart knowledge in the field of Environmental Engineering, a laboratory is developed at IITRAM. Here, the students are given hands on experience to latest environmental analysis methods. Following is the list of facilities available to date:

1. BOD incubator
2. Trinocular microscope
3. Jar test apparatus
4. Dissolved oxygen meter
5. Turbidity meter
6. COD digester
7. Deionized (DI) water system
8. Total organic carbon analyzer
9. Ion chromatograph (VoltIC)

Surveying Laboratory: The data collected by surveying is used in various projects to plan roadways & tunnels, build pipelines & bridges, track movement of pollutants in waterways & determine ocean floor erosion rates after storms and earthquakes. In this laboratory, students will learn to measure & calculate heights, depths, relative positions, property lines & other characteristics of terrain.

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|---------------------------|----------------|
| 1. Advanced Total station | 6. Compass |
| 2. GPS | 7. Chain |
| 3. Digital theodolite | 8. Plane table |
| 4. Auto level | 9. Cross staff |
| 5. Dumpy level | |

Hydraulics Laboratory: The purpose of Hydraulics lab is to look insight into the fluids and to understand the basic principles and the phenomenon of the fluid flow. The laboratory is equipped with following instruments.

1. Hydraulic bench
2. Types of notches/weirs for flow measurements through open channel
3. Types of orifices/ mouthpieces for flow measurements through tank
4. Venturimeter apparatus
5. Orifice meter apparatus
6. Bernoulli's theorem apparatus
7. Reynolds experiment apparatus
8. Stoke's law apparatus
9. Friction factor apparatus
10. Impact of jet apparatus
11. Free and forced vortex apparatus
12. Advanced hydrological/rainfall simulator

Civil Soft Computing Laboratory: To reduce human efforts, repetitive work, time ect., softwares are required. This laboratory is available with following softwares.

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|--------------|---------------------|
| 1. MX road | 5. STAAD Foundation |
| 2. Plaxis | 6. Watergems |
| 3. GeoStudio | 7. Hammer |
| 4. STAAD Pro | 8. Sewergems |

Research Facilities

In addition to all basic instruments/equipment required for conducting undergraduate level experiments, the department has procured a number of advanced and sophisticated instruments with the objective to motivate post graduate students and to conduct research. The laboratories are being continuously upgraded with more and more advanced instruments in each specialization. A few of the advanced equipments in various Civil Engineering laboratories are follows:

1. Advanced hydrological/rainfall simulator
2. Automatic weather station
3. Polarising microscopes
4. Stereoscope microscopes
5. Trinocular microscopes
6. Deionized (DI) water system
7. Total organic carbon analyzer
8. Ion chromatograph (VoltIC)
9. Advanced triaxial testing system
10. Benkelman beam
11. Marshall stability apparatus
12. Total station
13. Ground penetrating radar