DEPARTMENT OF CIVIL ENGINEERING

- Established in 1961 at the inception stage of the institute.

Academic Programs	Year of Establishment	Student Intake
B. Tech. in Civil Engineering	1961	172 (JEE)
M. Tech. in Structural Engineering	1971	25 (GATE)
M. Tech. in Traffic and Transportation Planning	1985	25 (GATE)
M. Tech. in Offshore Structures	1987	25 (GATE)
M. Tech. in Environmental Geo-technology	2006	25 (GATE)
M. Tech. in Water Resources Engineering	2014	16 (GATE)
Doctor of Philosophy	1985	

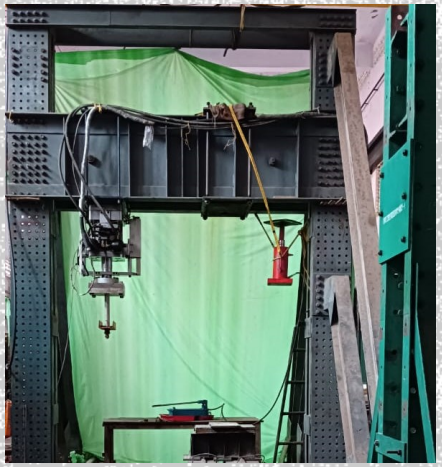
Shake table assembly test system

- The test system is manufactured by Bangalore Integrated System Solutions (Pvt.) Ltd, and it is referred to as model Bi-00-300
- Is used for conducting seismic or earthquake simulation experiments on various structures and components.
- It is designed to replicate the dynamic forces and vibrations that structures experience during earthquakes.

This shake table assembly can take a payload and kg, and can produce a stroke of ±200 mm. It uses a controller-2350 can induce an acceleration of 2g. The provided loading provisions encompass a range of tests, including harmonic testing, sine sweep testing, resonance searching, Heterodyne testing, and random testing.

500kN Servo Hydraulic Actuator system

- Actuator system model is Bi-03-Ec-801-05 and made by BISS, Bangalore
- It is used for conducting structural testing, particularly for evaluating the behavior and performance of large-scale structural components or systems under various loading conditions.
- The servo-hydraulic actuator system provides a powerful and controlled force application to simulate real-life loads and dynamic forces on structures.
- This is used for the slow rate cyclic loading, lateral loading(shear wall and frame), and vertical loading (beam-column joint).



The maximum loading capacity of the actuator system is 500 kN. It can produce a stroke of ± 75 mm.

Hydraulic UTM with PC Based control and measurement system

- The model type is HL-590.25 and manufactured by Hydraulic engineering and instruments
- It performs various mechanical tests on construction materials and structural components.
- The UTM is designed to apply and measure a material's forces, deformations, and other mechanical properties under controlled conditions.
- The PC-based control and measurement system enhances the precision, accuracy, and data acquisition capabilities of the testing process

The maximum capacity of this hydraulic UTM is 1000 kN. Universal testing machines (UTMs) test mechanical properties such as tensile, flexural, compressive, and shear.

Department: Civil Engineering

Steam Curing Chamber with Boiler

- This equipment is manufactured by Shri Brahma Industries.
- It is used for the accelerated curing of concrete specimens.
- The steam curing chamber with a boiler facilitates the curing process by providing controlled steam and temperature conditions.
- The steam curing chamber allows for the rapid curing of concrete specimens by creating an environment of elevated temperature and high humidity.

Transportable InfraRed Traffic Logger (TIRTL)

- This is a multi-purpose traffic sensor that can be used as a
  - Traffic counter
  - Speed sensor
  - Red light camera sensor
  - Heavy vehicle tracker
  - Overheight vehicle sensor
  - Rail crossing sensor
  - Network management system
- Cost: AUD 24000
- Utilised by Undergraduate, Postgraduate and Research students

Hamburg Wheel Tracker

- Hamburg wheel tracking test gives rutting resistance of the bituminous mixes
- Specimen holder of 295 x 365 x 60 mm holds two specimens of 150 x 60 mm, Steel wheel, 47 mm wide and loaded under 705 N makes 30 passes over each sample per minute
- Initial commands like number of passes, target rut depth, test temperature etc., can be given through an electronic display interface unit attached to this device
- Rut depth in mm corresponding to each wheel pass is obtained as output
- Cost: EURO 31070
- Utilised by Undergraduate, Postgraduate and Research students

Repeated Load Test Set-up

- To determine the fatigue characteristics of the asphalt mixture
- A closed-loop electrohydraulic system is used to apply the loads
- Vertical and horizontal deformations for any particular load application are measured by using linear variable displacement transformers.
- A heat chamber also provided to perform at different temperatures
- Permanent horizontal deformations are measured by using a cantilevered arm device.

- Cost: Rs.12,54,750/-
- Utilised by Undergraduate, Postgraduate and Research students

Asphalt Roller Compactor

- To simulate the on-site action of street roller by compaction of bituminous mixture through a segmented roller with alternated operated rotation.
- Roller compactor can be used for the preparation of blocks.
- Blocks are prepared by placing the mix in the moulds which are compacted by the rammer
- Available mould sizes(in mm) are
  - 320×260×180
  - 305×305×50
  - 305×305×100
  - 305×400×50
  - 400×500×180
  - 305×400×100
  - 320×260×50
- Cost: Rs. 28,92,680/-
- Utilised by Undergraduate, Postgraduate and Research students

Dynamic Shear Rheometer

- Dynamic shear rheometer (DSR) is capable of quantifying both elastic and viscous properties
- Binder-filler interaction ability can be evaluated quantitatively via the rheological properties of binders and mastics
- Rheology is used to assess the deformation and flow of materials
- **Major Rheological tests**
  - Multiple stress creep recovery (MSCR)
  - Frequency sweep test
  - Linear amplitude sweep (LAS) test
  - Temperature sweep test

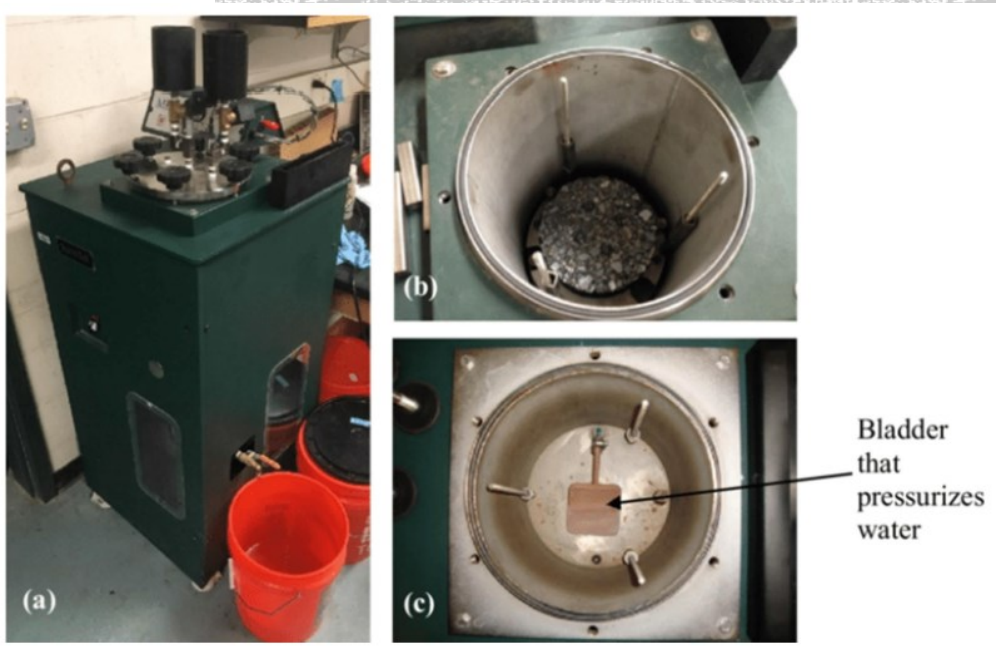
- Cost: Rs. 34,60,185/-
- Utilised by Undergraduate, Postgraduate and Research students

Superpave Gyratory Compactor

- To prepare bituminous specimen by applying compaction Compaction is achieved by the application of a vertical stress (normally 600 KPa)
- The compactor tilts the specimen moulds at an angle of 1.16 degrees and gyrates specimen moulds at a rate of 30 gyrations/minute throughout compation.
- It can be used for both hot mix and cold mix, for cold mix (emulsion),can be compacted with perforated moulds
- 150mm and 100mm internal diameter moulds provided with and without perforations
- Cost: EURO 30991
- Utilised by Undergraduate, Postgraduate and Research students

Moisture Induced Stress Tester (MIST)

- MIST works on the principle to provide cyclic stresses and pore pressure on the bituminous sample similar to the stresses seen by a wet bituminous pavement from passing vehicle tires.
- MIST (Moisture Induced Stress Tester) simulates pavement stripping mechanisms, which are due to water and repeated traffic loading.
- The MIST consists of a pressurized chamber, which conditions samples by pushing and pulling temperature controlled water through a compacted bituminous sample, thus creating pore pressure and simulating the action of an automobile tire on a wet surface
- Cost: $26405
- Utilised by Undergraduate, Postgraduate and Research students



Cyclic Triaxial Testing System

This facility is used to determine the dynamic properties of undisturbed or reconstituted soils. This instrument is mainly used as a high strain elemental testing system for soils. This instrument is used by both PG and PhD students.

Make: HEICO

Applications: This equipment can be used

- To understand the soil behavior during earthquakes or cyclic loading conditions.
- To determine the dynamic shear modulus and damping ratio of soils at higher strain levels.
- To conduct soil liquefaction studies

Cyclic Triaxial Testing System

Digital Static Triaxial Testing System

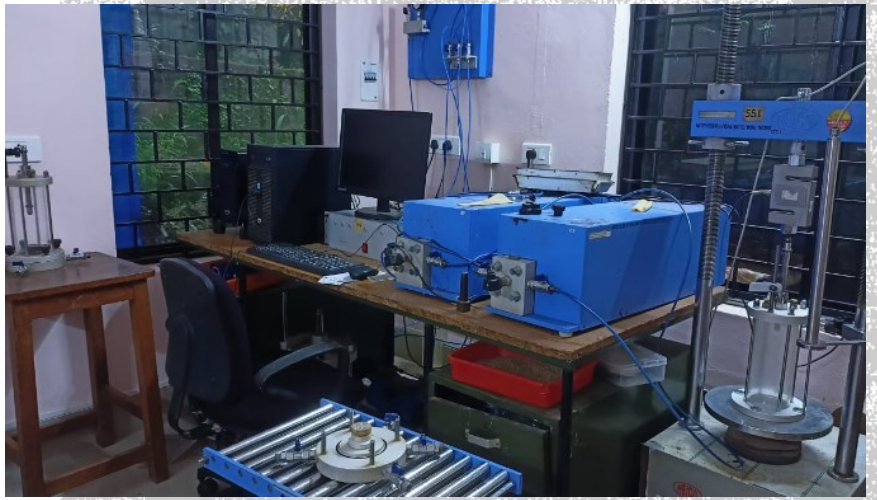
The engineering behavior of the soil under static load can be evaluated using Digital Triaxial Testing Facility. This instrument is used by UG, PG and PhD students.

Make: HEICO

Applications: This equipment can be used

- To evaluate the shear strength parameters of soil
- To understand the stress strain response of saturated and unsaturated soils under different drainage conditions.

These measurements are useful while designing foundations, earth retaining structures, land slide hazard assessments etc.



Digital Static Triaxial Testing System

Atomic Absorption Spectrophotometer (AAS)

- The instrument is with 6 lamb holding capacity.
- Hallow Cathode Single element lamps for the elements viz. Na, K, Ca, Mg, Cr, Mn, Fe, Ni, Cu, Zn, Cd, Al, Si, P, Co., with high Efficiency lamps of single element for Pb, Hg, As.
- AAS is useful for assessing the concentration of heavy metals from the water, wastewater and air sample to the ppb level.
- The instrument is much useful for the PG students, research scholars, for research and consultancy also.

Atomic Absorption Spectrophotometer (AAS)

(Make : Perkin Elmer; Model : PINAACLE 900F)

Gas Chromatography (GC - MS)

- The instrument is with Flame Ionization Detector (FID), and Electron Capture Detector
- The instrument is also equipped with Mass Spectroscopy for the analysis of unknown organic compounds.
- The compounds which has low boiling points lower than 300^0C can be easily analyzed by this Technique.
- The main areas of application of gas chromatography are Analysis of toxic compounds, solvents, hydrocarbons as well as in forensic field, Pollution studies, environmental analysis.

Gas Chromatography (GC - MS)

Make: PerkinElmer

Model: Clarus 580

Department: Civil Engineering

TOC Analyser with TN analyser

- Used for the analysis of total organic carbon present in the water and wastewater sample.
- The instrument is also equipped with Total Nitrogen analyzer module which can analyze nitrogen concentration present in the wastewater sample.
- The instrument avails an ultra wide range of measurement from 4 µg/L to 30,000 mg/L
- The instrument is used for the measurement of Total organic carbon present in wastewater sample which can be extended to solid sample also.

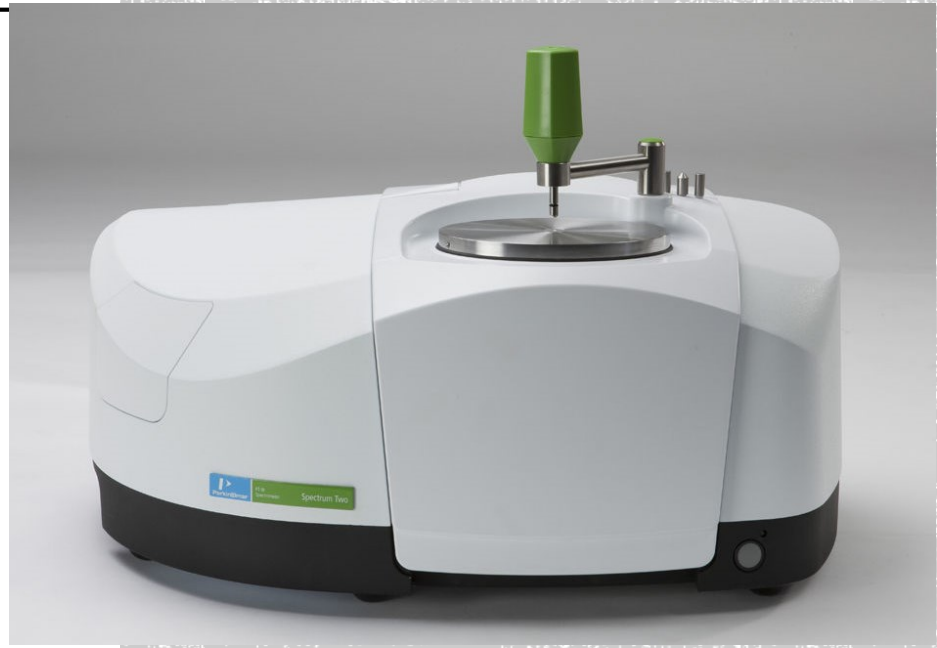
TOC Analyser with TN analyser

Make: Shimadzu

Model: TOC-L

Fourier Transform Infra-Red (FTIR)

- Fourier-transform infrared spectroscopy (FTIR) is a technique used to obtain an infrared spectrum of absorption or emission of a solid, liquid, or gas.
- FTIR's applications include identification and structural characterization of soil minerals, including phyllosilicates and metal oxides.
- It also applicable in monitoring pedogenic processes, characterizing soil organic matter composition, and measuring and characterizing the interactions of molecules, such as ions and organic compounds, with minerals.



Fourier Transform Infra-Red (FTIR)

(Make : Perkin Elmer; Model : Spectrum Two)

Stereomicroscope

- High-quality images that allow measurements and can be accurately repeated with minimal effort.
- The Leica coded stereo microscopes help you to pave the way to correct results.
- Fully apochromatic corrected zoom optics deliver high quality images
- Customize the microscope system to your task with the exclusive range of accessories
- Highly applicable in microplastic identification and characterization apart from microbial analysis.

Stereomicroscope

(Make : Leica; Model : 165C)

Portable Laser Aerosol Spectrometer

- Grimm laser aerosol spectrometers and dust monitors use a laser diode as light source.
- The wavelength of infrared range at 780 nm and to visible range at 655 nm.
- The instrument is much useful for the analysis of dust particles present in the atmosphere.
- The instrument gives the count and mass of particles at different size ranging from 10 micrometer to 0.01 micrometer.

Portable Laser Aerosol Spectrometer
(Make : Grimm Aerosol Technik
Model : 11 - R)

High Performance Liquid Chromatography

- High performance liquid chromatography is used for separating and analyzing organics in a mixture.
- HPLC has a wide application in the field of
  - drug analysis in the production process of pharmaceutical and biological products,
  - helps in detecting performance enhancement drugs in urine,
  - separating the components of a complex biological sample, or of similar synthetic chemicals from each other,
  - detecting vitamin D levels in blood serum, etc.

High Performance Liquid Chromatography
(Make : Shimadzu
Model : Prominence Bin)

Vectrino Profiler 3D Profiling Velocimeter

- Utilized for measuring velocities in open channel flows.
- Provides three-component velocity observations over 30 mm depth with 1 mm resolution

3D Profiling Velocimeter for measuring vertical velocity profiles up to 3 cm depth

Spectra Precision SP80 GNSS receiver

Cost (INR)	1189453
Year of purchase	2018
Utilization	1. B.Tech. courses CE2091D, CE3029D, CE2011D 2. PG and PhD Research purposes

The Spectra Precision SP80 GNSS receiver combines decades of GNSS RTK technology with revolutionary new GNSS processing. Featuring the new 240-channel "6G" chipset, the SP80 system is optimized for tracking and processing signals from all GNSS constellations.

Department: Civil Engineering

Structural Engineering Lab

- Load tests on large-scale structural elements like beams, slabs, columns, and frames are offered by the structural engineering lab
- Lab is equipped with major equipment, such as
  - Loading frames 40T and 100T capacities
  - Shake table facility
  - Load Cells and Load Indicator, 10 channels
  - Digital Strain Indicator (Data logger), 10 channels
  - Digital Strain Indicator (Data logger), 3 channels
  - Digital Displacement Indicators and Sensors
  - Hydraulic Jacks with digital Indicators
  - Proving Rings
  - LVDT and Demec gauges
  - Prestressing Jacks
  - Steam curing chamber
  - NDT equipments



The structures lab offers load tests on real-size specimens for various research and consultancy work.

Concrete Lab

- The laboratory provides testing services for cement, coarse and fine aggregates, bricks, roofing, flooring tiles, and concrete mix design.
- Concrete lab consists of
  - Hot Air Ovens (Thermostatic and Electrically operated)
  - Humidity chamber
  - Accelerated Curing Tank
  - Sieve Vibrating Machine with Timer
  - Flow Table
  - Los Angeles Abrasion Testing Machine
  - Vibrating Table-2 No.
  - Rock Cutting Machine
  - Deval's Attrition Testing machine
  - Tile Testing Machine
  - Air Permeability Apparatus

The concrete lab is a specialized facility that tests and analyzes various aspects of concrete materials and structures. Provides testing facilities mainly for undergraduate students, research and consultancy requirements.

Department: Civil Engineering

Material Testing lab

- Material testing lab is an important facility for evaluating construction material's mechanical properties, behavior, and performance.
- Major equipment in the lab are:
  - Compression and Bending Testing Machine, 300T capacity
  - Digital Universal Testing Machine, 1000kN capacity
  - Universal Testing Machine, 1000kN capacity
  - Universal Testing Machine, 40T capacity
  - Digital Universal Testing Machine, 200kN capacity
  - Universal Wood Testing Machine, 4T capacity
  - Brinell Hardness Testing Machine-2No.
  - Rockwell Hardness Testing Machine
  - Vickers Hardness Testing Machine
  - Torsion Testing Machine-2 No

The laboratory offers various testing like Tension tests on steel rods, Tension test on Electric transmission hardware fittings, Compression tests on concrete cubes and cylinders, Compression tests on hollow clay and cement building blocks, Compression tests on concrete paving blocks, Hardness tests on metals and Bending tests on RCC slabs which are used for the undergraduate students, research and consultancy work.

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NATIONAL INSTITUTE OF TECHNOLOGY CALICUT

Department: Civil Engineering

Transportation Engineering Lab

- Transportation Engineering Laboratory comprises of
  - Traffic Engineering Laboratory
  - Pavement Engineering Laboratory
  - Computational Lab
- Major Equipment in Traffic Engineering Laboratory
  - TIRTL
  - Total Station and GPS
- Major Equipment in Traffic Engineering Laboratory
  - Dynamic Shear Rheometer
  - Hamburg Wheel Tracker
  - Superpave Gyratory Compactor
  - Asphalt Roller Compactor
  - Asphalt Content Gauge
  - Corelok
  - Rolling Thin Film Oven Pressurised Aging Vessel
  - Non-nuclear Asphalt Density Gauge
- Major Software in Computational Lab
  - EMME
  - VISSIM
  - VISUM
  - CUBE
  - AMOS
  - OpenRoads

Geotechnical Engineering Lab

The Geotechnical Engineering Laboratory is well-equipped with testing equipment for evaluating all engineering properties of soils, including index properties, compaction characteristics of soils, hydraulic characteristics, rate of consolidation and shear strength. The equipment ranges from the most fundamental to the most sophisticated for teaching and research. The laboratory is also equipped with bender element and cyclic triaxial testing facilities to evaluate the dynamic properties of soils.

Environmental Engineering Lab

- Environmental Engineering Lab of Civil Engineering Department is committed to provide distinctive, internationally recognized testing and research facility in the field of water, wastewater, air and climate change by providing cutting edge instrumentation and technical facilities.
- Environmental Engineering Lab has its unique nature compared to other labs of the region with sophisticated instruments and the basic instrumentation facilities.
- The lab has supported more than five sponsored projects and actively involved in testing and consultancy activities across the Environmental Engineering domain.
- All the parameters standardized by IS 10500-2012 for Water, CPCB for wastewater and Air can be measured and monitored in the Environmental Engineering Lab.

Environmental Engineering lab is well equipped with the basic and advanced instruments like AAS, GC-MS, HPLC, Portable Laser Aerosol Spectrometer, Stereomicroscope, FTIR, TOC-TN Analyser, UV-Visible spectrophotometer, Ammoniacal Nitrogen analyser, Anderson sampler, High volume Sampler, etc.

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Department: Civil Engineering

Offshore Engineering Lab

- Major Equipment
- Impeller type current meter
- Under water load sensor
- Underwater pressure transducer
- Angular accelerometer
- Wave gauge
- Wave Flume (40m x 2m x 2m)
- Wave Basin (15m x 10m x 0.8m)
- Towing Tank (110m x 4m x 4m)

These laboratories are used by

- M.Tech –for their major project
  – for their Offshore Engineering Lab course
- B.Tech – for their B.Tech projects and
- Phd – for their research work

Department: Civil Engineering

Water Resources Engineering Lab

- This lab mainly caters to the needs of PG and PhD students working in Water Resources Engineering
- Experimental facilities
  - Experimental flume, Basic hydrology apparatus, 3D Profiling velocimeter, Pressure plate apparatus, Current meters, Bench Scale Membrane Filtration Cell
- Computational facilities
  - Workstation Computers (8 Nos), Desktop Computers (14 Nos.), Computer Server (1 No)
  - Professional Software - Watershed Modeling System, Groundwater Modeling System, MIKE11-MIKE SHE Enterprise, HYDRUS 2D/3D, ArcGIS Desktop, ERDAS IMAGINE Professional with Photogrammetry Suite, MIKE HYDRO RIVER with several additional modules, FLOW3D

The Water Resources Engineering laboratory has the experimental and computational facilities for carrying out research in the field of hydraulics and hydrology

Surveying Lab

Major Equipments	**Global navigation satellite system** **Total Station** **Micro-optic Theodolite** **Vernier Theodolite** **Dumpy Level** **Auto Level** **Prismatic Compass**
Utilization	1. B.Tech. courses CE2091D Surveying lab CE3029D Remote Sensing and GIS CE2011D Surveying and levelling 2. PG and PhD Research purposes 3. Testing /Consultancy Services for External Agencies Topographic surveys using total station and DGPS

Department: Civil Engineering

Conference Hall

- Seating Capacity - 40 nos.
- Facilities available:
  - Personal Computer
  - LCD Projector
  - White Board
  - Air Conditioned
- Located in the first floor near Civil Engineering Office in Department block

Seminar Hall

- Seating Capacity - 75 nos.
- Facilities available:
  - Personal Computer
  - LCD Projector
  - Audio system with 2 wired and 2 wireless mics
  - Web conference camera - HD
  - Interactive digital writing board
  - White Board
  - Chalk board
  - Air Conditioned
- Located in the first floor near Civil Engineering Office in Department block

Department: Civil Engineering