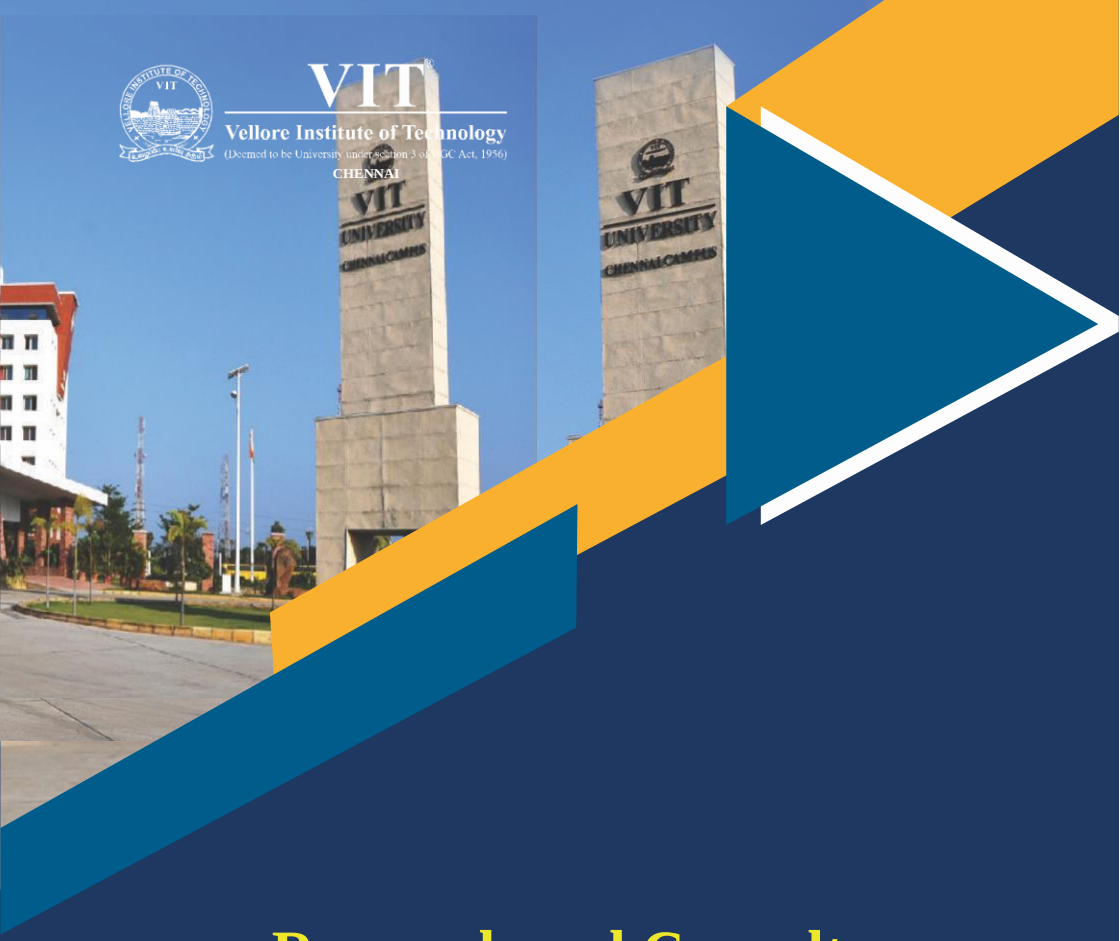

Research and Consultancy Brochure

School of Civil Engineering

Vellore Institute of Technology

Chennai - 600 127

http://chennai.vit.ac.in

About VIT

It was established under Section 3 of the University Grants Commission (UGC) Act, 1956, and was founded in 1984 as a self-financing institution called the Vellore Engineering College. The Union Ministry of Human Resources Development conferred University status on Vellore Engineering College in 2001. The University is headed by its founder and Chancellor, Dr. G. Viswanathan, a former Parliamentarian and Minister in the Tamil Nadu Government. In recognition of his service to India in offering world class education, he was conferred an honorary doctorate by the West Virginia University, USA. Mr. Sankar Viswanathan, Dr. Sekar Viswanathan and Mr. G. V. Selvam are the Vice-Presidents; Ms. Kadhambari S. Viswanathan is the Assistant Vice-President, Dr. Rambabu Kodali is the Vice-Chancellor and Dr. Kanchana Bhaaskaran V. S. is the Pro-Vice Chancellor, VIT Chennai. They share in the mission to make VIT a global center.

The focuses are :

- To maximize the Industrial connectivity
- To create Centers of Excellence in contemporary areas of research
- To enrich Technological and Managerial Human Capital nurtured in a multicultural ambience
- To provide a common platform for the agglomeration of ideas of personnel from various walks of life for learning enrichment
- To create opportunities and exploit the available resources to benefit industry/society
- To encourage participation in the National Agenda of knowledge building
- To foster International collaborations for mutual benefits in areas of research

About School

The School of Civil Engineering (SCE) is one of the best Civil Engineering programs in Chennai and has grown into a completely developed school with faculty members from all the major areas in civil engineering with most of them having doctoral degrees from eminent institutions across the globe with industrial and research exposure.

The school offers B.Tech. programme in Civil Engineering, M. Tech. programme in Structural Engineering, five year integrated M.Tech. programme in Construction Technology and Management and Ph.D. degree programme in various contemporary topics with tailor-made curriculum and syllabus to meet the current industry standards, on par with the best Civil Engineering programs in Chennai. The school embraces applied learning through research in all the courses of Civil and Structural Engineering. True to its stature as one of the best Civil Engineering programs in Chennai, the school has modern facilities, enabling cutting edge research in a wide spectrum of technological areas. This enables the students in acquiring the required skills to excel in their fields of interest.

The students from the school are highly successful in getting excellent opportunities to join the industry, having their own start-ups, or in pursuing higher studies in leading universities in India and abroad. As one of the best Civil Engineering programs in Chennai, we exhibit a strong relationship with our alumni, industries and research institutes in India and other foreign universities. This active collaboration has cemented our place among the best Civil Engineering programs in Chennai and enabled our students as alumni to take up roles in prestigious organisations and academic institutions across the globe.

Division of Structural and Geotechnical Engineering

2D and 3D Drafting and n-Dimensional Building Information Modeling (nD BIM) of Structural Systems such as RCC residential and commercial buildings, Industrial systems/structures, Steel and Composite Structures, and Pre-Engineered/Precast structural systems, MEP Modelling, Constructability Analysis and Clash Detection using Autodesk AutoCAD and Autodesk Revit.

Data Analysis and Applied Machine Learning for Civil Engineering namely Data-driven machine learning applications, Agile Methodology, Business Analytics for Construction Projects and Construction Informatics using R, R Studio, and Python 3.

Advanced Construction Planning and Scheduling, Resource Levelling and Management, i.e., Preparing Planning and Schedule for construction of Residential and Commercial Building, Building/Construction Estimation, Quantity Take-off, Bill of Quantities (BoQ), drafting Tender and Contract documents and using Microsoft Project, and Autodesk Revit.

Advanced Analysis and Design of RCC Structures, Steel Structures and Composite Structures using Bentley STAAD Pro V8i including Static and Dynamic Analysis of RCC Structures and Steel Structures, Analysis and Design of Liquid Storage Structures, Retaining Wall Structures, Precast Concrete Structures, and Proof checking of the structural analysis and design for RCC Structures and Steel Structures.

Loading Frame

UTM & CTM

S.No	Tests	Equipment	Test Method /Techniques
1	Concrete Mix Design	Concrete Yard, Pan and Drum Mixture, Aggregate Testing Apparatus, Accelerated Curing	IS: 10262-2019 and ACI 411R
2	Test on Beams	100 Ton Frame with Deflecto	-
3	Test on Columns	50 Ton Frame with Deflecto Meter	-
4	Hardened Concrete Cubes	Compressive Testing Machine	IS : 516 - 1959 (RA 2013)
5	Test on steel rebars	Universal Testing Machine	IS 432- 1982 IS 1608- 2005
6	Bricks (Burnt Clay/Fly	Compressive Testing Machine	IS : 3495 (Part 1) - 1992
7	Concrete Mortar Cubes	Compressive Testing Machine	IS : 4031 (Part 6) - 1988
8	Polycarbonate (Plastic	Compressive Testing Machine	ASTM D695 – 15, 2015
9	Cement properties	Le Chatelier Apparatus/ Vicat's Apparatus	IS: 1727-1967, IS: 4031 – 1988 Part 4, IS: 4031 –
10	Coarse /Fine aggregate	Sieve, Specific Gravity Apparatus	ASTM-C144-11
11	NDT Test	Concrete and Existing Structures	IS & ASTM Standards
12	Durability Tests	Carbonation and Permeability	IS & ASTM Standards

S.No	Tests	Equipment	Test Method /Techniques
1	Moisture content	Harvard Miniature Compaction	IS 2720 –2 (1973)
2	Liquid limit & Plastic Limit	Brass Liquid limit Apparatus	IS 2720
3	Grain size analysis	Sieve with Sieve Shaker	IS:2720-4 (1985)
4	Consolidation test	Consolidation Test Apparatus (3	IS 2720-15 (1986)
5	Specific gravity	Pycnometer	IS2720-3-1 (1980)
6	Swelling test	Swell Test Apparatus	IS 2720-40 (1977)
7	Permeability	Permeability Apparatus (Constant and	IS2720-17 (1986)
8	Shear test	Direct Shear and Triaxial Shear	IS2720-11 (1993)
9	Sub-surface sounding for soil	Static Cone Penetrometer Test	IS4968-3 (1976)
10	Soil's Undrained shear strength	Vane Shear Test	IS4434 (1978)
11	Subgrade strength of soil	CBR Test Apparatus	IS 2720 16 (1976)
12	Land Survey and Topography	Survey Equipments	--

Contact:-

Structural Engineering and Concrete Laboratory

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Soil Mechanics Laboratory & Survey Lab

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Water and Wastewater Analysis Laboratory

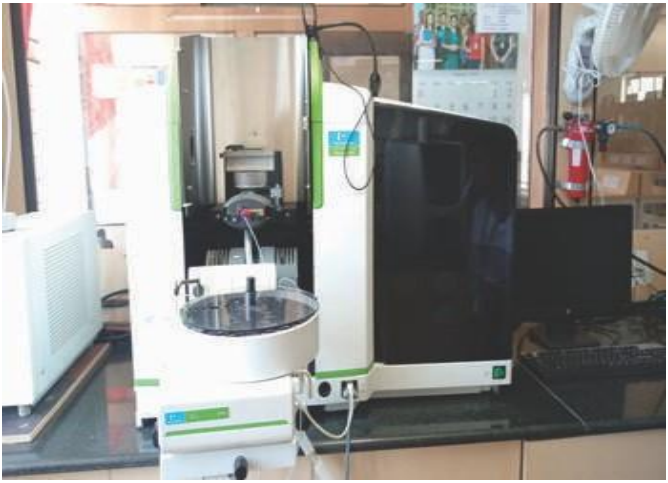
The following tests can be carried for nominal charges:

1. Cationic and Anionic Sample analysis (Li, Na, K, NH_4^+ , Ba, Ca, Mg; Fl^-,Cl^-, NO_2^-, Br^-,NO_3^-,PO_4^-,SO_4^{2-})
2. Reactive ammonia species analysis / cell growth analysis by UV spectroscopy
3. Phase contrast microscopic analysis of MLSS
4. Determination of Chemical Oxygen Demand in wastewater sample
5. Determination of Biochemical Oxygen Demand in wastewater sample
6. Determination of pH, conductivity, alkalinity and hardness in water/wastewater sample
7. Determination of Turbidity using nephelometer
8. Gram's staining to identify the various microorganism
9. Optimization of coagulant dose
10. Determination of total, volatile and fixed solids
11. Determination of TKN in wastewater sample
12. Estimation of bacterial colonies in a pour plate

1. Atomic Absorption Spectrometer (AAS)

Specification /Features:

- Double-beam flame spectrometer and graphite furnace atomizer on a single instrument
- Wavelength range: 184-900 nm
- Diffraction grating: 1800 lines/mm blazed at 236 nm and 597 nm
- Grating area: 64 x 72 mm
- Reciprocal linear dispersion: 1.6 nm/mm (nominal)
- Focal length: 267 mm
- Detector: Wide-range segmented solid-state detector



Atomic Absorption Spectrometer (AAS)

Capabilities:

- Ability to switch between flame and furnace in seconds
- Cutting-edge fiber optics to maximize light throughput for improved detection limits, high-speed automatic wavelength drive, automatic element identification with 8 lamp positions
- Determine up to 20 elements in one completely automated run

Applications:

The instrument can be used for analyzing:

(i) Soil and plant samples for minerals necessary for growth

(ii) Rraw chemicals as well as fine chemicals

(iii) Heavy metals in water, soil and air

(iv) Quality assurance and testing for contamination of food

(v) Toxic substance identification

2. High Performance Liquid Chromatography (HPLC)

Specification /Features:

- Up to 10 mL/min flow rate supporting up to 62 MPa (9000 psi/620 bar) backpressure for column format and column particle size flexibility
- Manual injection valve with contact closure for automated data acquisition start
- Chromeleon 7.2 CDS software package
- Four-solvent channel pump for versatile gradient methods, with integrated 4-channel degasser
- UV-Visible detector

Capabilities:

- Obtain near-zero dead volume for optimal peak shapes even over extended periods using Thermo Scientific™
- Separation and analysis of non-volatile or thermally unstable compounds
- Can be used to investigate toxic metabolite production due too proliferation of microorganisms

Applications:

Excellent for routine use in the pharmaceutical industries, research laboratories, analytical laboratories, clinical laboratories, and research institutes. Useful for multiple disciplines of research such as environmental organic chemistry, Paleo marine geology, microbiology, and environmental monitoring.

High Performance Liquid Chromatography

3. Ion Chromatography (IC)

Specification /Features:

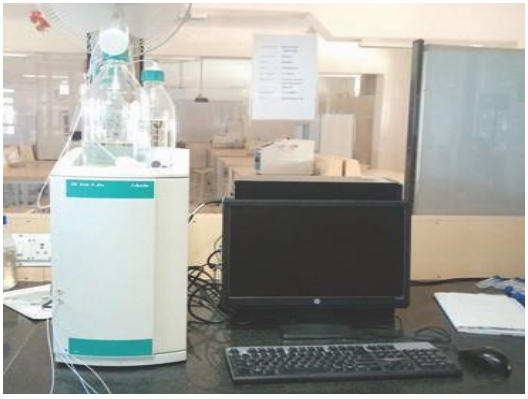
- Metrosep cationic column
- Metrosep anionic column with Metrohm Suppressor Module connector and chemical suppressor
- MagIC Net Basic software
- iPump with 0.001 to 1 mL/min flow rate
- IC Conductivity Detector with 0 to 20000 µS/cm
- iColumn technology 1 separation column and guard column
- Pulsation absorber

Capabilities:

- Allows anions, cations and polar substances to be determined in different matrices
- Precise and reliable output
- Can be used for almost any kind of charged molecule including large proteins, small nucleotides and amino acids
- Used for both analytical and preparative purposes in the laboratory

Applications:

Excellent for routine applications in water and wastewater analysis, food sector or the chemical industry. Useful for multiple disciplines of research such as environmental engineering, environmental chemistry, biology, nanotechnology and nano-science.



Ion Chromatography

4. Total Carbon Analyzer (TOC/TCA)

Specification /Features:

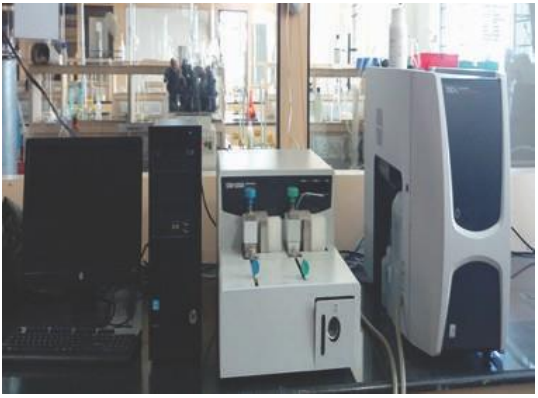
Analyte	:	TC, IC, TOC (TC-IC)
Method	:	TC: Catalytically aided combustion oxidation at 900°C; IC: Pre-acidification, oven temperature: 250°C
Measuring range	:	TC: 0.1 mg to 30 mg carbon; IC: 0.1 mg to 20 mg carbon
Sample Amount	:	1 gram - aqueous content < 0.5 g
Repeatability	:	S.D. ±1% of full scale range
Analysis Time	:	5 to 6 minutes at a gas rate of 500 mL/min.
Carrier Gas	:	99.9% O2 at 500 mL/min.
Ambient temp. req	:	5° to 35° C
Power req.	:	100-127V or 220-240V as ordered. 12A: TOC-5A: SSM-7A. 50/60Hz
Weight	:	About 30 kg

Capabilities:

- Highly sensitive, non-specific measurement of all organics present in a sample
- Can verify carbon content in solid and liquid samples
- Chemical analysis to be carried out on potential petroleum source rock in oil exploration

Applications:

It is particularly important in detecting contaminants in drinking water, cooling water, water used in semiconductor manufacturing, and water for pharmaceuticals. The organic carbon load in wastewater samples also can be analysed. The organic carbon content in the sludge can be determined. Useful for multiple disciplines of research.



Total Carbon Analyzer

5. UV-Visible Spectrometer (UV-Vis)

Specification /Features:

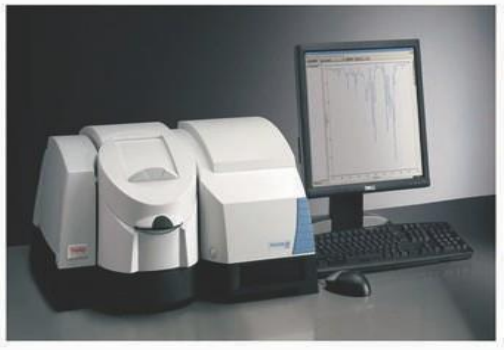
Certifications/Compliance	:	21 CFR Part 11 and audit-proof IQ/OQ/PQ documentation. ISO 9001:2000
Detector Type	:	Dual Matched Silicon Photodiodes
Range (Photometric)	:	>4A
Wavelength Accuracy	:	± 0.20 nm (546.11 nm Hg emission line); ± 0.3 nm for 190 - 900 nm
Accuracy	:	± 0.004A at 1A, ± 0.004A at 2A, ± 0.006A at 3AÅ

Capabilities:

- Measures the intensity of light transmitted through a sample compared to a reference measurement of the incident light source
- Qualitative and quantitative information of a given compound or molecule
- Liquid samples are analyzed

Applications:

The instrument can be routinely used in analytical chemistry for the quantitative determination of different analytes, such as transition metal ions, highly conjugated organic compounds, and biological macromolecules.



UV-Visible Spectrometer

Geosciences Research Laboratory

The testing equipment and facilities in Geosciences research laboratory includes:

1. Microfossil separation from sediment samples (Deep-Sea benthic foraminifera and planktic foraminifera)
2. Palaeoenvironmental identifications and data (Distribution and ecology of foraminifera)
3. Reconstruction of past climate and Past ocean circulation
4. Production of high-quality, high-resolution, full-colour digital images of microfossils (this facility can be used to produce manuals on fossil taxa)
5. Geochemical analysis (TOC)

Testing facilities at Geosciences Research Lab

TOC

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The School of Civil Engineering (SCE) has high quality testing facilities and dedicated experts to carry out various testing and related activities in a meticulous manner and with nominal charges.

VIT®
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)
CHENNAI

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