

VRK GATE & ESE ACADEMY

Gayatri Degree College, Plot No.3,
Near RTC Complex, Thotapalem, Vizianagaram - 535 003.
Email ID: vrkgate@gmail.com ; vrkese@gmail.com

About the Academy

- ❖ VRK GATE & ESE Academy for Civil Engineering is established with a vision to offer quality education that builds knowledge, character, and a spirit of service.
- ❖ To offer Coaching through offline mode by bringing experienced faculty, adopting modern teaching methods, and student-centric approach ensure that every student achieves their maximum potential.
- ❖ Academy is initiated with Civil engineering to focus on providing high-quality education, structured courses, and continuous support to help students excel in competitive exams like GATE, ESE and other job oriented exams.

Details of Programmes offered

GATE - Civil Engineering	Long Term	Short Term
Target Year	2027	2027
Duration	12 Months	60 days (During Summer break)
Date of Commencement	04-12-2025	April 2026
Eligibility	3 rd , 4 th Year and Graduate Students	3 rd , 4 th Year and Graduate Students
Batch Timings	On Working Days 6PM to 9PM On Holidays 9 AM to 6 PM	9AM to 6 PM every day

Complete Syllabus Coverage, Weekly Tests,
Regular Doubt Clearing Sessions, Full-length mock exams.

Special Offer for
Long term batch

GATE Short Term will be offered at free of cost

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ESE Long Term in Civil Engineering

Target Year	: 2027
Duration	: 12 Months
Date of Commencement	: 04-12-2025
Eligibility	: 3 rd , 4 th Year and Graduate students

Batch Timings
On working Days 6 PM to 9 PM
On Holidays 9 AM to 6 PM



Why Choose This Academy ?



- Highly Experienced, well qualified and motivated faculty
- Focused and structured teaching methodology.
- Regular tests, mock exams, and Performance analysis.
- Personalized doubt clearing sessions for every student.
- Comprehensive and updated study materials aligned with the latest syllabus.
- Supportive and professional environment for effective learning.
- Emphasis on building confidence, speed, and accuracy in problem-solving.

Admission test

- The students will be selected for GATE & ESE Coaching, based on their performance in the admission test conducted by the academy.
- The fee concession will be provided to the student based on merit in the admission test.

Admission test Details :

No. of Questions : 50

Syllabus : Engineering Mathematics - 10, Engineering Aptitude (verbal, numerical, Reasoning -10),

Core Civil Engineering Subjects - 30

Date of Exam : 16-11-2025 at 10.00 AM

Duration of Exam : 90 minutes

Location : At the Academy

Mode of Exam : Offline

Location



For Registration



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By
Managing Directors

VRK GATE & ESE ACADEMY

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Section 1: Engineering Mathematics

Linear Algebra: Matrix algebra; Systems of linear equations; eigenvalues and eigenvectors.

Calculus: Functions of single variable; Limit, continuity and differentiability; Mean value theorems, local maxima and minima; Taylor series; Evaluation of definite and indefinite integrals, application of definite integral to obtain area and volume; Partial derivatives; Total derivative; Gradient, Divergence and Curl, Vector identities; Directional derivatives; Line, Surface and Volume integrals.

Ordinary Differential Equation (ODE): First order (linear and non-linear) equations; higher order linear equations with constant coefficients; Euler-Cauchy equations; initial and boundary value problems.

Partial Differential Equation (PDE): Fourier series; Separation of variables; solutions of one-dimensional diffusion equation; first and second order one-dimensional wave equation and two-dimensional Laplace equation.

Probability and Statistics: Sampling theorems; Conditional probability; Descriptive statistics – Mean, median, mode and standard deviation; Random Variables – Discrete and Continuous, Poisson and Normal Distribution; Linear regression.

Numerical Methods: Error analysis. Numerical solutions of linear and non-linear algebraic equations; Newton's and Lagrange polynomials; numerical differentiation; Integration by trapezoidal and Simpson's rule; Single and multi-step methods for first order differential equations.

Section 2: Structural Engineering

Engineering Mechanics: System of forces, free-body diagrams, equilibrium equations; Internal forces in structures; Frictions and its applications; Centre of mass; Free Vibrations of undamped SDOF system.

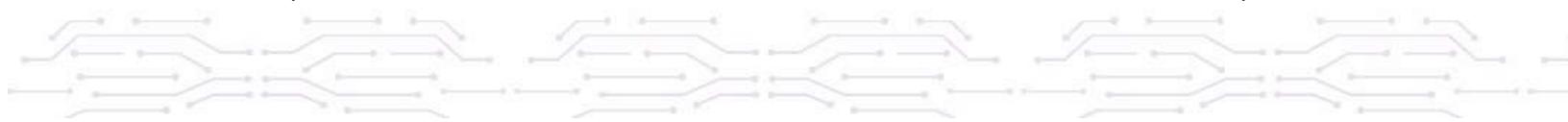
Solid Mechanics: Bending moment and shear force in statically determinate beams; Simple stress and strain relationships; Simple bending theory, flexural and shear stresses, shear centre; Uniform torsion, Transformation of stress; buckling of column, combined and direct bending stresses.

Structural Analysis: Statically determinate and indeterminate structures by force/ energy methods; Method of superposition; Analysis of trusses, arches, beams, cables and frames; Displacement methods: Slope deflection and moment distribution methods; Influence lines; Stiffness and flexibility methods of structural analysis.

Construction Materials and Management: Construction Materials: Structural Steel – Composition, material properties and behaviour; Concrete - Constituents, mix design, short-term and long-term properties. Construction Management: Types of construction projects; Project planning and network analysis - PERT and CPM; Cost estimation.

Concrete Structures: Working stress and Limit state design concepts; Design of beams, slabs, columns; Bond and development length; Prestressed concrete beams.

Steel Structures: Working stress and Limit state design concepts; Design of tension and compression members, beams and beam- columns, column bases; Connections - simple and



eccentric, beam-column connections, plate girders and trusses; Concept of plastic analysis - beams and frames.

Section 3: Geotechnical Engineering

Soil Mechanics: Three-phase system and phase relationships, index properties; Unified and Indian standard soil classification system; Permeability - one dimensional flow, Seepage through soils – two - dimensional flow, flow nets, uplift pressure, piping, capillarity, seepage force; Principle of effective stress and quicksand condition; Compaction of soils; One-dimensional consolidation, time rate of consolidation; Shear Strength, Mohr's circle, effective and total shear strength parameters, Stress-Strain characteristics of clays and sand; Stress paths.

Foundation Engineering: Sub-surface investigations - Drilling bore holes, sampling, plate load test, standard penetration and cone penetration tests; Earth pressure theories - Rankine and Coulomb; Stability of slopes – Finite and infinite slopes, Bishop's method; Stress distribution in soils – Boussinesq's theory; Pressure bulbs, Shallow foundations – Terzaghi's and Meyerhoff's bearing capacity theories, effect of water table; Combined footing and raft foundation; Contact pressure; Settlement analysis in sands and clays; Deep foundations – dynamic and static formulae, Axial load capacity of piles in sands and clays, pile load test, pile under lateral loading, pile group efficiency, negative skin friction.

Section 4: Water Resources Engineering

Fluid Mechanics: Properties of fluids, fluid statics; Continuity, momentum and energy equations and their applications; Potential flow, Laminar and turbulent flow; Flow in pipes, pipe networks; Concept of boundary layer and its growth; Concept of lift and drag.

Hydraulics: Forces on immersed bodies; Flow measurement in channels and pipes; Dimensional analysis and hydraulic similitude; Channel Hydraulics - Energy-depth relationships, specific energy, critical flow, hydraulic jump, uniform flow, gradually varied flow and water surface profiles.

Hydrology: Hydrologic cycle, precipitation, evaporation, evapo-transpiration, watershed, infiltration, unit hydrographs, hydrograph analysis, reservoir capacity, flood estimation and routing, surface run-off models, ground water hydrology - steady state well hydraulics and aquifers; Application of Darcy's Law.

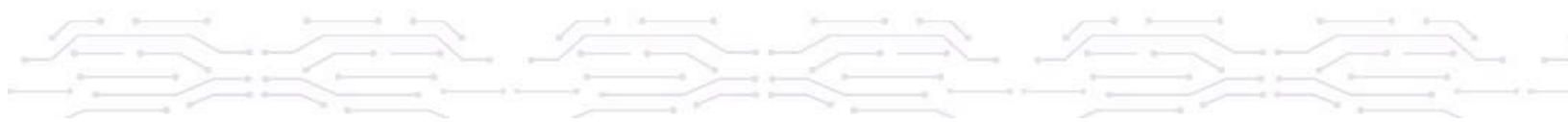
Irrigation: Types of irrigation systems and methods; Crop water requirements - Duty, delta, evapo-transpiration; Gravity Dams and Spillways; Lined and unlined canals, Design of weirs on permeable foundation; cross drainage structures.

Section 5: Environmental Engineering

Water and Waste Water Quality and Treatment: Basics of water quality standards – Physical, chemical and biological parameters; Water quality index; Unit processes and operations; Water requirement; Water distribution system; Drinking water treatment.

Sewerage system design, quantity of domestic wastewater, primary and secondary treatment. Effluent discharge standards; Sludge disposal; Reuse of treated sewage for different applications.

Air Pollution: Types of pollutants, their sources and impacts, air pollution control, air quality



standards, Air quality Index and limits.

Municipal Solid Wastes: Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

Section 6: Transportation Engineering

Transportation Infrastructure: Geometric design of highways - cross-sectional elements, sight distances, horizontal and vertical alignments.

Geometric design of railway Track – Speed and Cant.

Concept of airport runway length, calculations and corrections; taxiway and exit taxiway design.

Highway Pavements: Highway materials - desirable properties and tests; Desirable properties of bituminous paving mixes; Design factors for flexible and rigid pavements; Design of flexible and rigid pavement using IRC codes.

Traffic Engineering: Traffic studies on flow and speed, peak hour factor, accident study, statistical analysis of traffic data; Microscopic and macroscopic parameters of traffic flow, fundamental relationships; Traffic signs; Signal design by Webster's method; Types of intersections; Highway capacity.

Section 7: Geomatics Engineering

Principles of surveying; Errors and their adjustment; Maps - scale, coordinate system; Distance and angle measurement - Levelling and trigonometric levelling; Traversing and triangulation survey; Total station; Horizontal and vertical curves.

Photogrammetry and Remote Sensing - Scale, flying height; Basics of remote sensing and GIS.

