



VAAGDEVI COLLEGE OF ENGINEERING

Autonomous

Bollikunta, Warangal (Mandal), Warangal-506 005 (T.S),

DEPARTMENT OF CIVIL ENGINEERING

VISION

To empower the graduates with high technical competencies to meet proficient and societal challenges in the field of Civil Engineering and Technology.

MISSION

- To impart pioneering teaching and learning practice to the Civil Engineering graduates and educate them in the emerging technologies in Civil Engineering
- To promote quality education, research and consultancy services in area of Civil Engineering to fulfill the needs of industries and society.



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M. Tech – STRUCTURAL ENGINEERING

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs) of the M.Tech (Structural Engineering)

The Graduates of the programme will be able to:

1. Proficient in planning, analysis, design and execution of diverse projects with due consideration to issues concerning society and environment.
2. Adopt new innovative technology by continuously updating their knowledge through lifelong learning.
3. Analyze socio-industrial problems and present feasible solutions through critical thinking and research.
4. Continue professional development in this field or in related interdisciplinary fields with a background in structural engineering.

PROGRAMME OUTCOMES (POs) of the M.Tech (Structural Engineering)

The Graduates of the programme will be able to:

1. Acquire in-depth knowledge of Structural Engineering discipline with an ability to evaluate, analyse and synthesise existing and new knowledge, and integration of the same for enhancement of knowledge.
2. Create, select, learn and apply acceptable techniques, resources, and modern Structural Engineering tools to complex engineering activities with an understanding of the limitations.



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3. Understand the impact of the Structural Engineering solutions in societal and environmental contexts, and demonstrate the knowledge for sustainable development.
4. Design, integrate and administrate new structural problems using emerging technologies.
5. Understand about group dynamics, recognize opportunities and contribute positively to collaborative research in multidisciplinary aspects.

PROGRAMME SPECIFIC OUTCOMES (PSOs) of the M.Tech (Structural Engineering)

The Graduates of the programme will be able to:

1. Expose advanced courses in Analysis and Design of structures as per the latest design codes, current national and international scenario on Structural Engineering.
2. Integrate and administrate solution for new structural problems using modern technology and literature.
3. Address the societal needs by interdisciplinary approach through advanced and allied courses.



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COURSE OUTCOMES (Cos) - M.Tech – STRUCTURAL ENGINEERING

Course Outcome	Semester: I-Sem	Subject Name (Code): Theory of Elasticity (M18SE01)	No. of Hours : L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	apply elastic analysis to study the fracture mechanics			
2	apply linear elasticity in the design and analysis of structures such as beams, plates, shells and sandwich composites			
3	Apply hyperelasticity to determine the response of elastomer-based objects.			
4	analyze the structural sections subjected to torsion.			
5	understand various theories of failure and concept of plasticity.			
Course Outcome	Semester: I-Sem	Subject Name (Code): Behaviour of Concrete Structures (M18SE02)	No. of Hours : L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Obtain Knowledge of the behavior of reinforced concrete structures and Identify reinforced concrete failure modes from crack patterns			
2	Understand the behaviour of flexural members			
3	Determine bond length, lap splice and detailing requirements for reinforced concrete members			
4	Demonstrates the behaviour of short column under axial, uni-axial & bi- axial bending and slender columns			
5	Understand the concept of Yield line theory			
Course Outcome	Semester: I-Sem	Subject Name (Code): Matrix Methods of Structural Analysis (M18SE12)	No. of Hours: L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Distinguish between stable and unstable and statically determinate and indeterminate structures.			
2	Apply strain energy (Betti's law) for determinate and indeterminate structures			
3	Form the stiffness and loading matrices of an idealized structure, with a focus on building and bridge structures			
4	Analyze indeterminate beams, frames and trusses using displacement method and flexibility method			
5	Discuss the fundamental concepts and theories of Matrix Methods for analysis of skeletal structures such as beams, plane and space trusses, plane and space frames and grillage structures			



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Course Outcome	Semester: I-Sem	Subject Name (Code): Stability of Structures (M18SE13)	No. of Hours L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Understand stability of static and dynamic equilibrium.			
2	Determine the buckling loads for simple columns and frames, have an understanding of the concept of effective length and its use in design			
3	Analyse the beams for lateral - torsional buckling			
4	Differentiate how the tangent modulus and double modulus theories of inelastic buckling led to the column paradox, thereby preventing further difficulties for a general theory of structures.			
5	Apply advanced numerical techniques to bucking analysis of structures.			
Course Outcome	Semester: I-Sem	Subject Name (Code): Advanced Concrete Technology (M18SE14)	No. of Hours: L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Develop an advanced knowledge of the mechanical performance of cement-based materials Use advanced laboratory techniques to characterize cement-based materials and determine the			
2	properties of concrete ingredients i.e. cement, sand, coarse aggregate by conducting different tests.			
3	Understand the mix design and engineering properties of special concretes such as high- performance concrete, self-compacting concrete, fibre reinforced concrete, etc.			
4	Understand the safety steps involved in the design of form work and false work			
5	Design high grade concrete and study the parameters affecting its performance			
Course Outcome	Semester: I-Sem	Subject Name (Code): Forensic Engineering and Rehabilitation of structures (M18SE15)	No. of Hours: L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Learn various distress and damages to concrete and masonry structures.			
2	Understand NDT techniques for condition assessment of structures for identifying damages in structures.			
3	Describe and apply the importance of quality control in concrete construction and significance of protection and maintenance of structures.			
4	Identify repairs and remedies to be adopted for rehabilitation of buildings.			
5	Asses existing conditions of buildings.			
Course Outcome	Semester: I-Sem	Subject Name (Code): Prefabricated Structures (M18SE16)	No. of Hours: L: 3 T: 0 P: 0 Total: 3	Credits: 3



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1	Gain Knowledge on basic concepts of prefabrication, types and its systems			
2	Obtain knowledge on handling and erection stresses in prefabrication and adopt the design Principles for prefabricated structures			
3	Get knowledge on production, transportation and erection of prefabricated structures			
4	To have a detailed knowledge in designing and detailing of various prefabricated units			
5	Identify suitable prefabricated components for specific use			
Course Outcome	Semester: I-Sem	Subject Name (Code): Theory of Plates (M18SE17)	No. of Hours: L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Understand the behavior of cylindrical bending in plates			
2	Analyze plates under different boundary connections by various classical methods, special and approximate methods			
3	Perform cylindrical bending of long rectangular plates, pure bending of rectangular and circular plates, and small deflection theories for various boundary conditions.			
4	Understand the behaviour of orthotropic plates, grids and folded plates.			
5	Enrich research capability in plates and apply the theory of plates in engineering designs.			
Course Outcome	Semester: I-Sem	Subject Name (Code): Structural Design Laboratory (M18SE03)	No. of Hours: L: 0 T: 0 P: 0 Total: 4	Credits: 3
1	Create a program using arrays and functions for matrix manipulation			
2	Create a program to draw bending moment and shear force diagrams			
3	Learn program to design slab, beams, columns and footings			
4	Learn program to analyze truss, multi storey frame and bridge deck slab			
Course Outcome	Semester: I-Sem	Subject Name (Code): Advanced Concrete Laboratory (M18SE04)	No. of Hours: L: 0 T: 0 P: 4 Total: 4	Credits: 2
1	Test Fineness, Specific Gravity, Setting Time, Soundness and Compressive Strength of Cement			
2	Test physical properties of Coarse Aggregate and Fine Aggregate			
3	Test Workability of Fresh Concrete and Compressive strength, Split Tensile Strength of Hardened Concrete			
4	Demonstrate ability to make selection of materials based on their properties, behaviour and intended use in design and construction			



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Course Outcome	Semester: II-Sem	Subject Name (Code): Finite Element Methods (M18SE05)	No. of Hours: L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Understand the fundamental concepts of the Finite Element Method (FEM).			
2	Make use of shape function and interpolation function to study structural behavior.			
3	Apply linear and quadratic elements in the finite element analysis of various types of structures.			
4	Gain knowledge on basic concept on non linear analysis			
5	Learn and apply finite element solutions to structural, thermal, dynamic problem to develop the knowledge and skills needed to effectively evaluate finite element analyses performed by others.			
Course Outcome	Semester: II-Sem	Subject Name (Code): Structural Dynamics (M18SE06)	No. of Hours: L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Apply the fundamental concepts and definitions used in structural dynamics.			
2	Characterize the dynamic properties of a structure such as natural frequencies and mode shapes and to compare these to the properties of the load.			
3	Calculate the natural frequency of a system using equilibrium or energy methods.			
4	Determine the effect of viscous damping on the response of a freely vibrating system.			
5	Evaluate forces and design earthquake resistant structure.			
Course Outcome	Semester: II-Sem	Subject Name (Code): Experimental Techniques (M18SE18)	No. of Hours: L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Apply experimental techniques using strain gauges to solve field problems.			
2	Gain knowledge on characteristics of structural vibrations and wind flow.			
3	Measure distress in the structures using various electronic equipment.			
4	Obtain knowledge on advanced NDT methods in accessing the load testing of structures.			
5	Use various vibration measuring instruments and analyze the structures using digital display unit.			
Course Outcome	Semester: II-Sem	Subject Name (Code): Analysis of Foundations (M18SE19)	No. of Hours: L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Obtain knowledge on types of deep foundation and factors governing on it.			
2	Analyze the piles with static formulae			
3	Gain knowledge on piles placed in group			
4	Design appropriate foundation systems based on ground-investigation data and be able to select correct soil parameters for the designs			
5	Appraise foundation design concepts in the choice of appropriate foundation and design simple foundations.			
Course Outcome	Semester: II-Sem	Subject Name (Code): Neo Construction Materials (M18SE20)	No. of Hours: L: 3 T: 0 P: 0 Total: 3	Credits: 3



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1	Demonstrates the knowledge on light weight aggregate concrete and its application			
2	Gain knowledge on high strength and high performance concrete methods			
3	Know behaviour of special concrete and its effects on properties of concrete			
4	Study about corrosion and its prevention in reinforced concrete			
5	Understand the use of advanced materials in construction projects			
Course Outcome	Semester: II-Sem	Subject Name (Code): Offshore Structures (M18SE21)	No. of Hours: L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Calculate wave forces on fixed and floating structures			
2	Illustrates different types of foundations for offshore structures			
3	Gain Knowledge on static and dynamic analysis for foundations of offshore structures			
4	Conduct analysis of floating platform and Interpret transfer functions on the basis of a thorough understanding of the governing physical effects			
5	Conduct fundamental global stability checks of various floating and bottom supported offshore structures			
Course Outcome	Semester: II-Sem	Subject Name (Code): Tall Buildings (M18SE22)	No. of Hours: L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Study the behavior of different types of tall structural systems			
2	Analyze tall structures for vertical and lateral loads with various methods and approaches			
3	Gain the knowledge to select appropriate type of tall building depending on physical factors			
4	Understand approximate analysis, accurate analysis and reduction techniques			
5	Acquisition of skills and competences for the analysis and design of Tall Buildings			
Course Outcome	Semester: II-Sem	Subject Name (Code): Design of Prestressed Concrete Structures (M18SE23)	No. of Hours: L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	To understand the principles of pre-stressing, materials of pre-stressing, different systems of prestressing, structural behaviour, advantages, losses of pre-stress, deflection of pre-stressed members.			
2	Analyze and design prestressed flexure members and horizontal and vertical shear in prestressed members			
3	Study the behaviour of composite sections under prestressing			
4	Realize the importance of prestressing the long span structures and heavily loaded members..			
5	Develop skills in planning, analysis and design of prestressed concrete beams, and slabs.			
Course Outcome	Semester: II-Sem	Subject Name (Code): Advanced Computing Laboratory (M18SE07)	No. of Hours: L: 0 T: 0 P: 4 Total: 4	Credits: 2
1	Gain knowledge about Modelling, analysis and designing of RCC elements using FEM tool.			



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2	Understand to design pre-stressed concrete elements.			
3	Able to analyze steel member and bridge structure using FEM analysis.			
4	Gain knowledge about response of dynamic analysis of structure			
5	Able to analyze retaining wall and water storage structures			
Course Outcome	Semester: II-Sem	Subject Name (Code): Numerical Analysis Laboratory (M18SE08)	No. of Hours: L: 0 T: 0 P: 4 Total: 4	Credits: 2
1	Obtain Roots of non-linear equations by Bisection method and Newton's method.			
2	Perform calculations on system of Linear Equations using Gauss - Elimination/ Gauss - Seidal Iteration/ Gauss - Jorden Method			
3	Integrate Numerically Using Trapezoidal and Simpson's Rules			
4	Calculate Numerical Solution of Ordinary Differential Equations by Euler's Method, Runge-Kutta Method			
Course Outcome	Semester: II-Sem	Subject Name (Code): English for Research Paper Writing (M18AC01)	No. of Hours: L: 2 T: 0 P: 0 Total: 2	Credits: 2
1	The student will be able to understand the nuances of research writing			
2	The student will be able to write a research paper with required writing skills and be confident to share their writing with others			
3	The student will be able to publish a paper using the requisite standard in a journal			
4	The student will be able to work on citations and ably place them in her research paper			
5	The student will be able to avoid plagiarism and be able to develop her own writing skills in presenting the research work			
Course Outcome	Semester: III-Sem	Subject Name (Code): Design of Steel Concrete Composite Structures (M18SE24)	No. of Hours : L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Design of members subjected to axial and lateral loads			
2	Design the connection for composite members			
3	Design tension and compression members			
4	Understand the concept of steel-concrete composite construction			
5	Get introduced to composite construction and composite behaviour of steel concrete composite structures			
Course Outcome	Semester: III-Sem	Subject Name (Code): Underwater Construction (M18SE25)	No. of Hours : L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Understand problems in site preparation, drainage and shoring during excavation.			
2	Understand the concept of stability of slopes in excavation.			
3	Perform analysis of offshore platform on the basis of a thorough understanding of the governing physical effects.			



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4	Make use of underwater tunnelling techniques in practical applications.			
5	Obtain knowledge on underwater foundation for structures.			
Course Outcome	Semester: III-Sem	Subject Name (Code): Earthquake Analysis and Design of Structures (M18SE26)	No. of Hours : L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Understand the basics of earthquake engineering and how they influence the structural design.			
2	Predict the sources of earthquakes understanding seismology and conceptually design the buildings			
3	Apply basic methods employed for analysis of civil engineering problems involving dynamics and earthquake.			
4	To access seismic performance of non-structural components and structural components and identify effective measures to mitigate potential damage.			
5	Understand the theoretical and practical aspects of earthquake engineering along with the planning and design aspects.			
Course Outcome	Semester: III-Sem	Subject Name (Code): Project Management (M18MB30)	No. of Hours : L: 3 T: 0 P: 0 Total: 3	Credits: 3
1	Importance of Project Management			
2	Project Planning, Execution and implementation			
3	Significance of teams in projects			
4	Evaluate the project techniques			
5	Understand the organizational behaviour of project management			