



SCHOOL OF ENGINEERING AND SCIENCES
B. Tech Civil Engineering
2022-26 Batch

B. Tech-Civil Engineering

Semester-3							
Category	Sub-Category	Course Title	L	T/D	P/Pr	Credits	Learning Hours
AEC	School AEC	Analytical Skills for Engineers	1	0	1	2	60
VAC	School VAC	Co-Curricular Activities	0	0	2	2*	60*
VAC	School VAC	Community Service and Social Responsibility	2	0	0	2*	60*
SEC	Department/School SEC	Probability and Statistics	2	0	1	3	90
CC	Core	Fluid Mechanics	2	1	1	4	120
CC	Core	Structural Mechanics	2	1	1	4	120
CC	Core	Spatial Data Acquisition	2	1	1	4	120
CC	Core	Civil Engineering Materials	2	0	1	3	90
OE/Minor	OE/Minor	MC-1/OE-1	3	0	0	3	90
Semester Total						23	690
Semester-4							
Category	Sub-Category	Course Title	L	T/D	P/Pr	Credits	Learning Hours
AEC	School AEC	Creativity and Critical thinking Skills	1	0	1	2	60
VAC	School VAC	Co-Curricular Activities	0	0	2	2*	60*
VAC	School VAC	Community Service and Social Responsibility	2	0	0	2*	60*
SEC	Department/School SEC	Numerical Methods and its Application in Civil Engineering	1	1	0	2	60
CC	Core	Reinforced Concrete Design	3	0	1	4	120
CC	Core	Soil Behaviour and Engineering	2	1	1	4	120
CC	Core	Modern Highway Engineering	2	1	1	4	120
CC	Core	Analysis of Determinate and Indeterminate Structures	2	1	1	4	120
OE/Minor	OE/Minor	MC-2/OE-2	3	0	0	3	90
Semester Total						23	690

Semester-5							
Category	Sub-Category	Course Title	L	T/D	P/Pr	Credits	Learning Hours
VAC	School VAC	Co-Curricular Activities	0	0	2	2*	60*
VAC	School VAC	Community Service and Social Responsibility	2	0	0	2*	60*
SEC	SEC Elective	Career Skills-1	1	0	2	3	90
CC	Core	Physico-chemical Water Treatment: Materials and Processes	2	1	1	4	120
CC	Core	Geotechnical Analysis and Design	2	1	1	4	120
CC	Core	Engineering Hydrology	1	1	1	3	90
CC	Core	Remote Sensing and GIS	1	1	1	3	90
CC	Core	High-Speed Railways, Airways, and Waterways Engineering	2	1	1	4	120
OE/Minor	OE/Minor	MC-3/OE-3	3	0	0	3	90
Semester Total						24	720
Semester-6							
Category	Sub-Category	Course Title	L	T/D	P/Pr	Credits	Learning Hours
VAC	School VAC	Co-Curricular Activities	0	0	2	2	60
VAC	School VAC	Community Service and Social Responsibility	2	0	0	2	60
SEC	SEC Elective	Career Skills-2	0	0	2	2	60
CC	Core	Wastewater, Treatment: Disposal to Resource Recovery	2	0	1	3	90
CC	Core	Building Information Modelling and Management	2	0	2	4	120
CC	Core	Design of Steel Structures	3	0	1	4	120
CC	Core Elective	Core Elective-1	2	0	1	3	90
CC	Core Elective	Core Elective-2	2	0	1	3	90
OE/Minor	OE/Minor	MC-4/OE-4	3	0	0	3	90
Semester Total						26	780

Semester-7							
Category	Sub-Category	Course Title	L	T/D	P/Pr	Credits	Learning Hours
CC	Core Elective	Core Elective-3	2	0	1	3	90
CC	Core Elective	Core Elective-4	2	0	1	3	90
CC	Core Elective	Core Elective-5	2	0	1	3	90
MC+OE	MC/OE	MC-5/OE-5	3	0	0	3	90
RDIP	Internship / Project	Summer internship/Project	0	0	4	4	120
Semester Total						16	480
Semester-8							
Category	Sub-Category	Course Title	L	T/D	P/Pr	Credits	Learning Hours
RDIP	Internship / Research / Thesis	Major Project	0	0	12	12	360
Semester Total						12	360

Specialization Electives: Sustainable Highway and Airport Pavement Engineering	
1	Sustainable Paving Technologies and Materials
2	Advanced Design and Analysis for Durable Pavements
3	Emerging Pavement Management Systems
4	Paving Industry: Theory to Practice
5	Research in Highway and Airport Pavement Engineering
Specialization Electives: Water Resources and Geographic Information Systems	
1	Earth Observation of Water Resources
2	Water Resources Planning and Management
3	Watershed Management
4	Applications of Remote Sensing & GIS in Water Resources
5	Applications of Soft Computing Techniques
6	Open channel flow
7	Land and Watershed management
8	Watershed Hydrology and Conservation Planning
Specialization Electives: Environmental Engineering and Management	
1	Design of water distribution network systems
2	Advanced water and wastewater treatment systems
3	Sustainable waste management systems
4	Environmental systems modeling
5	Air Quality in Changing Environments
Specialization Electives: Computational Structural Engineering	
1	Introduction to Computational Solid Mechanics
2	Computational Structural Design and Optimization
3	Finite Element Method for Structural Engineers
4	Structural Dynamic and Earthquake Engineering
5	Sustainable and Resilient Design of Structures
Specialization Electives: Geotechnical and Geo-environmental Engineering	
1	Designing with Geosynthetics
2	Advanced Soil Mechanics
3	Ground Improvement Techniques
4	Geotechnical Hazards
5	Environmental Geotechnics

Core Electives:

- 1 Digital Technologies for Construction
- 2 Advanced Reinforced concrete design
- 3 Introduction to Structural Dynamics
- 4 Earthquake Analysis and Design of Structures
- 5 Introduction to Finite Element Methods
- 6 Precast Structural Design and Construction
- 7 Reliability-Based Analysis and Design
- 8 Stability of Structures
- 9 Bridge Engineering
- 10 Introduction to Drone Technology
- 11 Design of Hydraulic Structure and Irrigation System
- 12 Design of Environmental engineering systems
- 13 Sustainable Waste Management Systems
- 14 Environmental Impact Assessment
- 15 Green Buildings

Minor Program:**Infrastructure Planning and Management**

- 1 Building Information Modelling
- 2 Highway Engineering and Management
- 3 Principles and Practice in Infrastructure and Environment
- 4 Water Resources for Smart and Livable Cities
- 5 Construction Methods and Equipment
- 6 Socio-economic Sustainable Developments

Open Electives:

- 1 Remote Sensing and GIS applications in Engineering
- 2 Drones for Asset Management
- 3 Civil Engineering Profession-Developing Nations

Appendix-I

Syllabus of III & IV Semesters

Semester-III

Analytical Skills for Engineers

Data Interpretation, Clocks and Calendar, Statistics, Functions and graphs, Graph Theory with respect to coding, Number system, pigeonhole principle, Discrete math Graph theory, Discrete planar theory, Puzzles and seating arrangements, Blood Relations, Direction Sense, Sudoku.

Probability and Statistics

The course presents the basic probability and statistical analysis concepts of engineering systems. Topics including fundamentals of probability, random processes, and distributions, are covered, along with random variables and vectors, uncertainty propagation, conditional distributions, Discrete and Continuous Probability Distributions, Introduction to regression analysis, and Hypothesis testing. The course will also introduce the Monte Carlo Simulation and Latin Hypercube sampling techniques. Basic statistical analysis using the MATLAB software package will also be delivered.

Fluid Mechanics

Fluid Mechanics is an inter-disciplinary course covering the basic principles and its applications in Civil Engineering, Mechanical Engineering and Chemical Engineering. The students will have new problem-solving approaches like control volume concept and streamline patterns which are nowadays required to solve the real-life complex problems. The visualization of the fluid-flow problems will be demonstrated to enhance students' interest in the subject.

Structural Mechanics

This course presents basic solid mechanics for structural engineers, including stress, strain, and constitutive laws; linear elasticity and visco-elasticity; introduction to static and thermal stresses; specialization of theory to one- and two-dimensional cases; plane stress and plane strain, rods, and beams; work and energy principles.

Spatial Data Acquisition

This course provides a comprehensive understanding and hands-on experience on traditional surveying techniques in civil engineering with modern data collection methods using IoT devices and drones. Basic principles of surveying, methodologies, and technologies involved in acquiring geospatial data for various applications in the domain of civil engineering will be covered in this course.

Civil Engineering Materials

This course will provide an introduction to the main structural engineering materials, structural steel, structural timber and its derivatives and reinforced concrete, plus some additional engineering materials. The course will cover how the materials are made, their properties, and how they are used in practice. The aim of this course is to provide a comprehensive overview of the general concepts behind the design and use of these materials, both separately and when acting together to produce a composite solution. Design problems and methodologies will be presented at a basic level as appropriate to the scope of the course.

Semester-IV

Creativity and Critical thinking Skills

Numerical Methods and its Application in Civil Engineering

The aim of the course is to develop a sound understanding of the various numerical techniques, principles, and their application to Civil engineering problems. Fundamental principles and basics of numerical methods will be covered. Some of the important numerical techniques and their applications will be discussed in detail.

Reinforced Concrete Design

The aim of this course is to provide students with a thorough understanding of the design of reinforced concrete structures. Topics covered will include design of beams and slabs for flexure and shear; detailing of flexural and shear reinforcement; behaviour of reinforced concrete members under combined flexure and axial load; design of short columns; behaviour and design of slender columns.

Soil Behaviour and Engineering

This course presents a comprehensive study of soil properties, encompassing soil characterization and flow through soils, with a particular emphasis on the interpretation of field and laboratory test data and their application in soft-ground construction engineering. The course covers a wide range of topics, including consolidation and secondary compression, basic principles of soil strength, stress-strain behavior of clays considering factors such as sample disturbance, anisotropy, and strain rate, as well as the strength and compression characteristics of granular soils. Additionally, the engineering properties of compacted soils, soil characterization techniques, and the principles of flow through soils are addressed in detail.

Modern Highway Engineering

This course is designed to train students in highway geometric design, traffic infrastructure design and analysis, and pavement engineering materials, design, construction, and management. Efforts are made to craft the course contents appropriate to the current industry practices and future research trends. Students will gain hands-on experience with software tools used in highway engineering wherever applicable. This course is offered in a project-based learning mode that includes projects with laboratory, field, and simulation components.

Analysis of Determinate and Indeterminate Structures

This course introduces classical methods of analysis to enable students to assess, quantify and communicate an understanding of statically determinate and indeterminate structures (such as continuous beams, trusses, plane frames, grids and multi-story frames). This course will cover analysis method for both determinate and indeterminate structures, introduction of types of structures and loads, analysis of statically determinate planar trusses, beams and frames, cables and arches, drawing shear and bending-moment diagrams of beams and frames, drawing influence lines, deflection calculation, virtual work method, analysis of indeterminate structure by force method. This course is a prerequisite for design courses, such as design of timber, steel and reinforced concrete structures.