IARE

INSTITUTE OF AERONAUTICAL ENGINEERING

NAAC ACCREDITATION A++ GRADE

NATIONAL BOARD OF ACCREDITATION

nirf INDIA RANKINGS 2023 TOP 200 ENGINEERING RANK 151-200 TOP 100 INNOVATION RANK 51-100

24 YEARS OF Excellence

B.TECH

CIVIL ENGINEERING

IF YOU CAN DREAM IT.
YOU CAN BUILD IT

ACADEMIC YEAR 2024-25

VISION AND MISSION OF THE INSTITUTE

VISION

To bring forth students, professionally competent and socially progressive, capable of working across cultures meeting the global standards ethically.

MISSION

To provide students with an extensive and exceptional education that prepares them to excel in their profession, guided by dynamic intellectual community and be able to face the technically complex world with creative leadership qualities.

Further, be instrumental in emanating new knowledge through innovative research that emboldens entrepreneurship and economic development for the benefit of wide spread community.

VISION AND MISSION OF THE DEPARTMENT

VISION

To produce eminent, competitive and dedicated civil engineers by imparting latest technical skills and ethical values to empower the students to play a key role in the planning and execution of infrastructural & developmental activities of the nation.

MISSION

To provide exceptional education in civil engineering through quality teaching, state-of-the-art facilities and dynamic guidance to produce civil engineering graduates, who are professionally excellent to face complex technical challenges with creativity, leadership, ethics and social consciousness.

B.Tech

Program Educational Objectives (PEOs)

PEO-I

Professional Excellence:

To impart proficiency in engineering knowledge and skills to analyze, design, build, maintain, or improve Civil Engineering based systems.

PEO-II

Understanding Socio-Economic Aspects:

To offer broad education and practical skills so that the students can carry out technical investigations within realistic constraints such as economic, environmental, societal, safety and sustainability.

PEO-III

Technical Collaboration:

To impart ability to collaborate with and function on multidisciplinary teams to offer engineering solutions to the society.

PEO-IV

Continued Self-Learning:

To create interest in the students to engage in life-long learning in advanced areas of civil engineering and related fields.

PEO-V

Effective Contribution to Society:

To educate the students in ethical values and social responsibility to use engineering techniques and modern tools necessary for civil engineering practice to serve the society effectively.

Knowledge and Attitude Profile

WK1

A systematic, theory based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2

Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

WK3

A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4

Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5

Knowledge, including efficient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6

Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7

Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8

Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9

Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

B.Tech Program Outcomes (POs)

PO-1 Engineering Knowledge

Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO-2 Problem Analysis

Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO-3 Design/Development of Solutions

Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO-4 Conduct Investigations of Complex Problems

Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO-5 Engineering Tool Usage

Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO-6 The Engineer and The World

Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO-7 Ethics

Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO-8 Individual and Collaborative Team work

Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO-9 Communication

Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO-10 Project Management & Finance

Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multi disciplinary environments.

PO-11 Life-Long Learning

Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

B.Tech Program Specific Outcomes (PSOs)

PSO-I

Design and supervise sub-structures and superstructures for residential and public buildings, industrial structures, irrigation structures, powerhouses, highways, railways, airways, docks and harbours.

PSO-II

Focus on improving performance of structures with reference to safety and serviceability, and sustainable green building technology.

PSO-III

Make use of Advanced Structural Analysis and Project Management Software for creating Modern Avenues to succeed as an Entrepreneur, Pursue Higher Studies and Career Paths.

ABOUT **Civil Engineering**

The Department of Civil Engineering is a hub of innovation and learning, focusing on the design, construction, and maintenance of infrastructure critical to society. Students and faculty collaborate on projects that span bridges, highways, water systems, and sustainable urban development. The curriculum integrates theoretical knowledge with practical applications, emphasizing problem-solving, environmental stewardship, and the use of advanced technologies.

Why Study Civil@IARE

- **Well-Trained Experts in areas of Structural Engineering, Geotechnical Engineering, Transportation Engineering, Environmental Engineering, and Construction Management.**
- **Well-Equipped Laboratory Facilities and conducive environment for students.**
- **International Exposure for students via mobility programs and student exchange.**
- **Industry Supported with strong partnerships and collaborations providing internships and job opportunities.**

Expertise and focus:

Our focus lies in generating novel insights and developing innovative solutions that have a tangible impact on society, academia, government agencies, industries, and the environment alike.

In the realm of civil engineering academia, our expertise and focus encompass a diverse array of specialized areas aimed at advancing knowledge and addressing pressing challenges in the field. Some key terms that encapsulate our academic pursuits include:

- **Structural Engineering**
- **Transportation Engineering**
- **Geotechnical Engineering**
- **Environmental Engineering**
- **Water Resources Engineering**
- **Construction Engineering and Management**
- **Sustainable Infrastructure**
- **Disaster Resilience and Risk Management**
- **Building Information Modelling (BIM).**

DEPARTMENT **SPECIFIC LABORATORIES**

Concrete Materials Laboratory

A Concrete Materials Laboratory is a facility equipped to analyze and test the properties of concrete and its constituent materials like aggregates, cement, and additives. Its purpose is to ensure the quality, durability, and performance of concrete structures by conducting various tests such as compressive strength, slump, density, and durability assessments. These evaluations are vital for construction projects, infrastructure maintenance, and material research, guaranteeing safety and efficiency in concrete applications.

Benefits

- **Hands-On Learning**
- **Quality Control and Assurance**
- **Research and Innovation**
- **Skill Development**
- **Industry Readiness**

Geotechnical Engineering Laboratory

The Geotechnical Laboratory is a specialized facility equipped with advanced tools and equipment designed to study and analyze soil and rock properties. It serves as a critical component in civil engineering education and research, allowing students and researchers to perform a wide range of tests to understand the behavior of geotechnical materials under various conditions. The lab supports activities such as soil classification, compaction, shear strength testing, and permeability analysis, which are essential for the design and construction of foundations, retaining structures, and other civil engineering projects.

Benefits

- **Hands-on experience with soil helps students understand the real-world properties and behaviors of geotechnical materials.**
- **specialized equipment and perform standard tests, which are essential skills for careers in geotechnical engineering.**
- **Laboratory work enhances students' abilities to diagnose and solve practical engineering problems related to soil mechanics.**
- **analyzing test data and making informed decisions based on empirical evidence, `which is crucial for safe and effective construction practices.**

Engineering Surveying Laboratory

The Surveying Laboratory at our institution is a pivotal facility where students learn essential techniques for measuring and mapping land and structures. Equipped with state-of-the-art instruments such as total stations, GPS devices, and digital levels, the lab provides hands-on training in precise measurement, data collection, and spatial analysis. Students gain practical experience in conducting topographic surveys, construction layout surveys, and boundary surveys. This practical exposure prepares them for careers in civil engineering, urban planning, and land management, ensuring they are adept at interpreting and utilizing spatial data effectively.

Objectives of Surveying Lab:

- **Developing practical skills in conducting land surveys and measurements.**
- **Mastering the ability to analyze and interpret survey data accurately.**
- **Fostering teamwork in surveying projects and exercises.**
- **Preparing for professional fieldwork and practical applications in civil engineering projects**

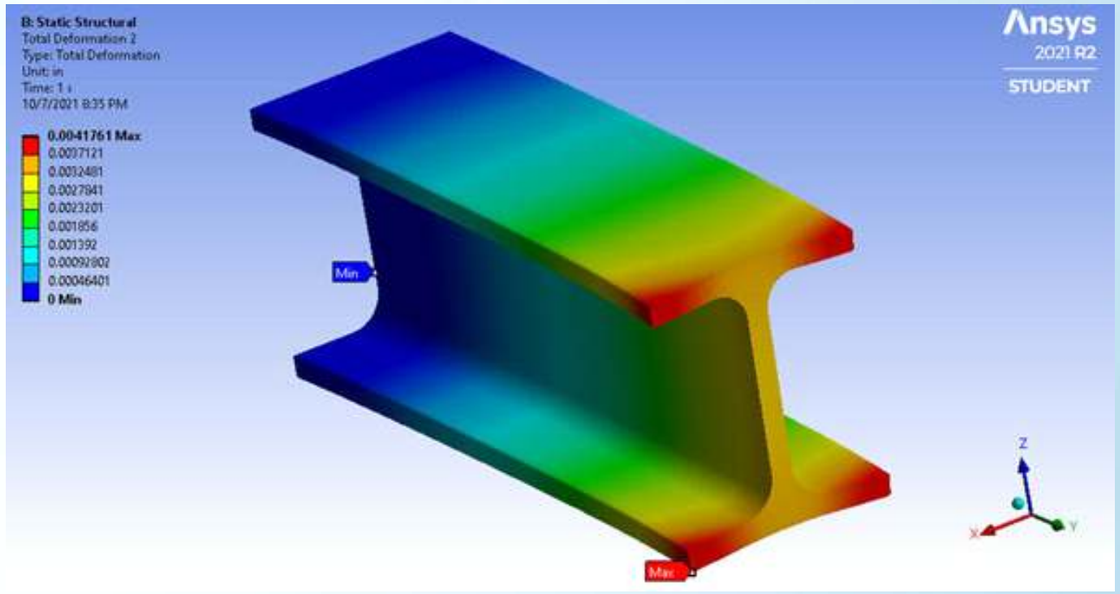
Advanced CAD Laboratory

STAAD.Pro

STAAD Pro is a sophisticated and widely used structural analysis and design software developed by Bentley Systems. It is utilized extensively in engineering, architecture, and construction industries for designing and analysing structures ranging from bridges and buildings to towers and tunnels. While primarily employed in commercial and industrial projects, its applicability extends to research facilities as well, where complex structural analyses are crucial for ensuring safety, stability, and efficiency of structures.

ANSYS-CFD

ANSYS is a powerful finite element analysis (FEA) software suite widely used in structural engineering for simulating and analyzing the behavior of structures under various loading conditions. It offers a comprehensive set of tools and capabilities tailored to address the complex challenges encountered in structural analysis and design. Here are some key aspects of ANSYS for structural engineering.



What Civil Engineers do?

Concept Generation:

This is the initial stage where ideas and concepts are generated. Civil engineers use their creativity and analytical skills to develop innovative solutions to meet specific needs or address particular challenges.

Planning and Design:

In this stage, civil engineers take the concepts generated and create detailed plans and designs. This involves using technical drawings, calculations, and simulations to ensure the structures will be safe, functional, and efficient.

Construction, Operation, and Maintenance over the Life-Cycle:

This final stage involves the actual construction of the designed structures and ensuring their operation and maintenance throughout their lifespan. Civil engineers oversee the building process, ensuring everything is constructed according to the plans and standards. They also manage the long-term maintenance to ensure the structures remain safe and functional.

Areas of Civil Engineering Expertise

Civil engineering offers a diverse range of career opportunities and specializations, allowing professionals to work on various projects related to infrastructure, construction, and environmental sustainability.

Structural Engineering:

Focuses on the design and analysis of buildings, bridges, and other structures to ensure they can withstand various loads and forces.

Transportation Engineering:

Involves the planning, design, operation, and maintenance of transportation systems such as roads, highways, railways, and airports.

Water Resource Management:

Deals with the management and distribution of water resources, including the design of dams, canals, and water treatment plants.

Geotechnical Engineering:

Concerns the behavior of earth materials and how they interact with man-made structures, including the design of foundations, retaining walls, and tunnels.

Environmental Engineering:

Focuses on developing solutions to environmental problems, such as pollution control, waste management, and sustainable design practices.

Coastal Engineering:

Involves the design and construction of structures and systems that protect coastal areas from erosion, flooding, and other environmental hazards.

Earthquake Engineering:

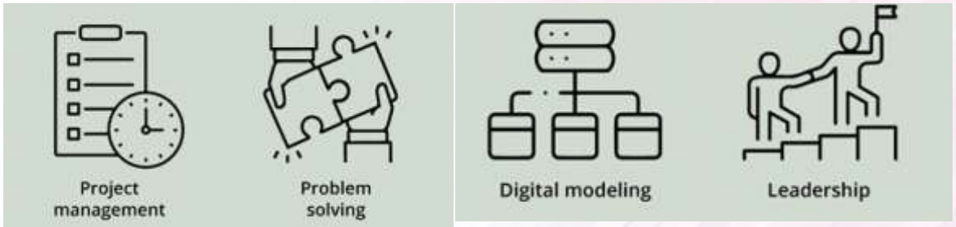
Specializes in designing structures that can withstand seismic activity and minimize damage during earthquakes.

Construction Management:

Focuses on the planning, coordination, and control of construction projects from inception to completion, ensuring they are completed on time, within budget, and to the required quality standards.

Structures and Infrastructures:

Skills Civil Engineers Posses



Project Management: This involves planning, organizing, and managing resources to bring about the successful completion of specific project goals and objectives. Civil engineers must be adept at scheduling, budgeting, and overseeing the progress of projects to ensure they are completed on time and within budget.

Problem Solving: Civil engineers must be able to identify problems and develop practical solutions. This requires analytical thinking and creativity to address challenges that arise during the planning, design, construction, and maintenance phases of projects.

Digital Modelling: Proficiency in digital modeling involves using software and technology to create detailed models and simulations of structures. This skill helps in visualizing and analyzing the design before construction begins, ensuring that potential issues are addressed early in the process.

Leadership: Leadership skills are essential for civil engineers to effectively manage teams, communicate with stakeholders, and lead projects to successful completion. This includes motivating team members, making informed decisions, and providing clear direction throughout the project lifecycle.

Laboratory **Details**

1 Advanced Structural Design Laboratory

This laboratory provides a solid foundation in object-oriented programming concepts and hands-on experience in using them. It introduces the concepts of abstraction and reusable code design via the object-oriented paradigm. Through a series of examples and exercises, students gain coding skills and develop an understanding of professional programming practices. Mastering Java facilitates the learning of other technologies.

Major Equipment

Computer Systems – 36 Nos

Make: Lenovo

Model: Think Center Neo 50s

Configuration: 12th Generation Intel Core I5- 12400 Processor, 16 GB DDR4 RAM, 512 GB SSD, Bluetooth, WiFi, 22" Monitor, Keyboard, Mouse

Software: MATLAB software R2015a, STAAD PRO

2 Hydraulic Engineering Laboratory

The Hydraulic Engineering Laboratory introduces key concepts and methods of fluid mechanics. It covers pressure estimation, hydrostatics, buoyancy, mass and momentum conservation, viscous flows, pipe flow, dimensional analysis, boundary layers, head loss, and hydraulic machines, essential for engineering students.

Major Equipment

1. Pelton turbine test rig
2. Kaplan turbine test rig
3. Francis turbine test rig
4. Flow through orifice and mouthpieces
5. Centrifugal pump test rig

3 Concrete Materials Laboratory

A Concrete Materials Laboratory tests and analyzes concrete and its components, such as aggregates, cement, and additives, to ensure quality, durability, and performance. It conducts tests like compressive strength, slump, density, and durability assessments, essential for construction projects, infrastructure maintenance, and material research, ensuring safety and efficiency in concrete applications.

Major Equipment

1. Compression Testing Machine of 200 kN Capacity
2. Accelerated Curing Tank
3. Ultrasonic Pulse Velocity
4. Permeability of Concrete
5. Rebound Hammer
6. Rapid chloride permeability Test apparatus
7. Precision Air Classifier

4 Geotechnical Engineering Laboratory

A Geotechnical Engineering Laboratory focuses on soil testing, offering detailed instructions, theory, apparatus, procedures, and calculations for various tests, explaining their importance and purpose comprehensively.

Major Equipment

1. Mechanical sieve shaker
2. Permeability apparatus
3. Universal Auto Compactor
4. California Bearing Ratio (CBR) apparatus
5. Triaxial-setup
6. Unconfined compression test apparatus
7. Direct shear apparatus

5 Strength Of Materials Laboratory

The Strength of Materials Laboratory provides a dynamic environment where theory meets practice through hands-on experiments. It features equipment like the Universal Testing Machine, strain gauges, extensometers, and safety gear, allowing you to explore material properties and their engineering applications.

Major Equipment

1. Major Equipment
2. Computerized Universal testing machine(40T capacity)
3. Compression testing machine
4. Electronic Extensometer 25/50 mm
5. PC based electronic panel for computerized UTM
6. Shear test attachment
7. Brinell cum Rockwell hardness
8. Brinell hardness tester
9. Torsion testing machine

6 Surveying Laboratory

A Surveying Laboratory conducts precise measurements and analysis of land and structures for engineering projects. Using instruments like total stations and theodolites, it aids in urban planning, infrastructure development, and land management.

Major Equipment

1. Vernier Theodolite
2. Auto Level
3. Dumpy Level
4. Compass

7 Surveying Laboratory

A Surveying Laboratory conducts precise measurements and analysis of land and structures for engineering projects. Using instruments like total stations and theodolites, it aids in urban planning, infrastructure development, and land management.

Major Equipment

1. Pentax Total Station
2. Electronic theodolite
3. Vernier thodolite

8 Transportation Engineering Laboratory

Transportation engineering laboratory focuses on aggregate testing and provides detailed instructions on how to conduct various types of tests. The experiments are accompanied by an introduction explaining their importance, theory, and purpose. The course also includes information on the required apparatus, procedure, and specimen calculations necessary for performing the experiments and computing the results.

Major Equipment

1. Ductility testing machine
2. Longitudinal Compress meter
3. Los angles abrasion test machine
4. Devals Attrition Test Machine

9 Advanced Materials Laboratory

An Advanced Concrete Laboratory focuses on analyzing and developing self-compacting concrete (SCC). It innovates mix designs, additives, and construction methods, optimizing SCC through advanced tests for flowability, stability, and strength, supporting durable, sustainable construction projects.

Major Equipment

1. Compression Testing machine
2. Flexural testing equipment
3. L box Apparatus
4. U box Apparatus
5. Rebound Hammer

10 Building Planning And Drawing Laboratory

The Building Planning and Drawing Laboratory uses CAD software to design and plan structures. It enables precise creation of architectural drawings, floor plans, and building layouts, enhancing accuracy and efficiency in construction projects.

Major Equipment

Computer Systems – 36 Nos

Make: Lenovo

Model: Think Center Neo 50s

Configuration: 12th Generation Intel Core I5- 12400 Processor, 16 GB DDR4 RAM, 512 GB SSD, Bluetooth, WiFi, 22" Monitor, Keyboard, Mouse

Software: MATLAB software R2015a, STAAD PRO,

FACULTY **INFORMATION**

Dr. R Ramya Swetha

Professor & Head

Ph.D (2019),
Doctoral Degree, JNTU, AP

M.Tech (2001),
Andhra University, Visakhapatnam, AP

B.Tech (1990),
Andhra University, Visakhapatnam, AP

AREA OF SPECIALIZATION

Structural Engineering

Dr. U Vamsi Mohan

Professor

Ph.D (2017), Doctoral Degree,
SV University, Tirupati, AP

M.Tech (1993),
Annamalai University, Tamil Nadu

B.Tech (1990), ANU, Guntur, AP

AREA OF SPECIALIZATION

Structural Engineering

Dr. Venu Malagavelli

Professor & Deputy Head

Ph.D (2015), Doctoral Degree,
BITS, Pilani, Rajasthan

M.Tech (2004), BITS, Pilani, Rajasthan

B.Tech (2001), JNTU, Hyderabad

AREA OF SPECIALIZATION

Structural Engineering

Dr. Kavita Singh

Associate Professor

Ph.D (2021), Doctoral Degree, JNTU , Hyderabad
M.Tech (2012), JNTU , Hyderabad
B.Tech (1997) MJPRU , UP

AREA OF SPECIALIZATION

GIS and Remote Sensing, Geology, Environmental Studies, Disaster Management and Mitigation, Construction Technology and Project Mangement, Concrete Technology

Dr. M Madhusudhan Reddy

Assistant Professor

Ph.D (2022), Doctoral Degree,
Koneru Lakshmaiah (D University), Guntur, AP

M.Tech (2016), JNTU Hyderabad

B.Tech (2013), JNTU, Hyderabad

AREA OF SPECIALIZATION

Geotechnical Engineering

Dr. Nandam Ramesh Babu

Assistant Professor

Ph.D (2020), Doctoral Degree
SV University, Tirupathi, AP

M.Tech (1993),
Dayalbagh Educational Institute (DU), UP

B.Tech (0000), AU, Visakhapatnam, AP

AREA OF SPECIALIZATION

Structural Engineering

Dr. Vemula Anand Reddy

Assistant Professor

Ph.D (2021), Doctoral Degree
SVNIT, Surat , Gujarat

M.Tech (2014), SVNIT, Surat , Gujarat

B.Tech (2012), JNTU, Hyderabad

AREA OF SPECIALIZATION

Geotechnical &
Geoenvironmental Engineering

Dr. M Maheswara Rao

Assistant Professor

Ph.D (2023), Doctoral Degree
Veer Bhadur Singh Purvanchal University, UP

M.Tech (2005), SV University, Tirupathi

B.Tech (1995), SV University, Tirupathi

AREA OF SPECIALIZATION

Geotechnical &
Geoenvironmental Engineering

Assistant **Professors**

Mr. G Rama Krishna
Mr. S Selvaprakash
Mr. K Anand Goud
Mr. R Suresh Kumar
Ms. N Sri Ramya
Ms. B Bhavani
Ms. Praveena Rao
Mr. V Suryaprakash Reddy
Mr. A Rajesh

COURSE MENU

Curriculum is designed based on professional modules from Microsoft, Alibaba, Huawei, CTS ,IEEE, ACM, and AICTE Model Curriculum in several subjects and so that students have opportunity to obtain professional certificates from the companies upon graduation.

Microsoft

Alibaba.com

Cognizant

HUAWEI

IEEE

acm Association for Computing Machinery

I SEMESTER

Course Code	Course Name	Credits	Prerequisites
THEORY			
AHSD01	Professional Communication	3	
AHSD02	Matrices and Calculus	4	Basic Principles of Algebra and Calculus
AEED01	Elements of Electrical and Electronics Engineering	3	Physics
ACSD01	Object Oriented Programming	3	
PRACTICAL			
AHSD04	Professional Communication Laboratory	1	
AEED03	Electrical and Electronics Engineering Laboratory	1	
ACSD02	Object Oriented Programming with Java Laboratory	2	
AMED01	Engineering Workshop	2	
EXPERIENTIAL ENGINEERING EDUCATION (ExEED)			
ACSD03	Essentials of Innovation	1	
MANDATORY COURSE			
AHSD06	Environmental Science		
TOTAL CREDITS		**20**	
CUMULATIVE CREDITS		**20**	

II SEMESTER

Course Code	Course Name	Credits	Prerequisites
THEORY			
AHSD03	Engineering Chemistry	3	Basic principles of chemistry
AHSD07	Applied Physics	3	Basic principles of physics
AHSD08	Differential Equations and Vector Calculus	4	Matrices and Calculus
AMED04	Engineering Mechanics	3	Matrices and Calculus
PRACTICAL			
AHSD05	Engineering Chemistry Laboratory	1	Basic Principles of Chemistry
AHSD09	Applied Physics Laboratory	1	Basic Principles of Physics
AMED05	Computer Aided Engineering Drawing	2	
ACSD06	Programming for Problem Solving Laboratory	2	
SKILL ENHANCEMENT PROJECT			
ACSD07	Mobile and Web Applications Development	1	
MANDATORY COURSE			
AHSD10	Gender Sensitization		
FIELD PROJECT			
TOTAL CREDITS		**20**	
CUMULATIVE CREDITS		**40**	

III SEMESTER

Course Code	Course Name	Credits	Prerequisites
THEORY			
AHSD11	Probability and Statistics	4	
ACED01	Strength of Materials	3	Engineering Mechanics
ACED02	Engineering Surveying	3	Linear Algebra and Calculus
ACED03	Fluid Mechanics	3	Engineering Mechanics
ACSD08	Data Structures	3	Python Programming
PRACTICAL			
ACED04	Engineering Surveying Laboratory	1	Linear Algebra and Calculus
ACED05	Strength of Materials Laboratory	1	
ACSD11	Data Structures Laboratory	1	Python Programming
SKILL ENHANCEMENT PROJECTS			
ACSD12	Prototype and Design Building	1	Essentials of Innovation
TOTAL CREDITS		**20**	
CUMULATIVE CREDITS		**60**	

IV SEMESTER

Course Code	Course Name	Credits	Prerequisites
THEORY			
ACED06	Theory of Structures	3	Strength of Materials
ACED07	Construction Materials	3	
ACED08	Hydraulic Engineering	3	Fluid Mechanics
ACED09	Engineering Geology	3	
ACED10	Concrete Materials	3	
PRACTICAL			
ACED11	Concrete Materials Laboratory	1	
ACED12	Hydraulic Engineering Laboratory	1	Fluid Mechanics
ACED13	Building Planning and Drawing Laboratory	1	Computer Aided Engineering Drawing
SKILL ENHANCEMENT PROJECT			
ACSD18	DevOps Engineer	2	
VALUE ADDED COURSE			
INTERNSHIP			
TOTAL CREDITS		**20**	
CUMULATIVE CREDITS		**80**	

V SEMESTER

Course Code	Course Name	Credits	Prerequisites
THEORY			
ACED14	Structural Analysis	3	Theory of Structures
ACED15	Hydrology and Water Resources Engineering	3	Fluid Mechanics
ACED16	Reinforced Concrete Design	3	Theory of Structures
ACED17	Soil Mechanics	3	Engineering Geology
	Program Elective – I	3	
PRACTICAL			
ACED23	Reinforced Concrete Design Laboratory	1	Computer Aided Engineering Drawing
ACED24	Soil Mechanics Laboratory	1	
SKILL ENHANCEMENT PROJECT			
	Skill #	2	
	Engineering Design Project	1	
VALUE ADDED COURSE			
TOTAL CREDITS		**20**	
CUMULATIVE CREDITS		**100**	

VI SEMESTER

Course Code	Course Name	Credits	Prerequisites
THEORY			
ACED25	Design of Steel Structures	3	Analysis of Structures
ACED26	Foundation Engineering	3	Engineering Geology, Soil Mechanics
	Program Elective – II	3	
	Program Elective – III	3	
	Open Elective – I	3	
PRACTICAL			
ACED39	Advanced Surveying Laboratory	1	Engineering surveying
ACED40	Design of Steel Structures Laboratory	1	Strength of materials, Structural Analysis
SKILL ENHANCEMENT PROJECT			
	Skill#	2	
	Product Development Project	1	
VALUE ADDED COURSE			
INTERNSHIP			
TOTAL CREDITS		**20**	
CUMULATIVE CREDITS		**120**	

VII SEMESTER

Course Code	Course Name	Credits	Prerequisites
THEORY			
ACED41	Transportation Engineering	3	Concrete Technology
ACED42	Environmental Engineering	3	Chemistry
	Program Elective – IV	3	
	Program Elective – V	3	
	Open Elective – II	3	
PRACTICAL			
ACED55	Transportation Engineering Laboratory	1	
ACED56	Project Planning Laboratory	1	
PROJECT WORK			
ACED57	Project Work (Phase - I)	3	
MANDATORY COURSE			
AHSD14	Essence of Indian Traditional Knowledge		
TOTAL CREDITS		**20**	
CUMULATIVE CREDITS		**140**	

VIII SEMESTER

Course Code	Course Name	Credits	Prerequisites
THEORY			
AHSD15	Managerial Economics and Financial Analysis	3	
	Program Elective - VI	3	
	Open Elective - III	3	
` PROJECT WORK			
ACED65	Project Work (Phase - II)	11	
TOTAL CREDITS		20	
CUMULATIVE CREDITS		160	

ELECTIVE **COURSES**

PROGRAM ELECTIVES COURSES (PEC)

The below listed courses are Professional electives and the student has to study six courses as professional electives.

Course Code	Name of the Course	Prerequisites	Preferred Semester	Credits
ACED18	Remote Sensing and GIS	Surveying	V	3
ACED19	Advanced Geographical Information Systems	Surveying	V	3
ACED20	Satellite Imagery in GIS	Surveying	V	3
ACED21	Geomatics Applications in Civil Engineering	Surveying	V	3
ACED22	Green Building Technologies	NILL	V	3
ACED27	Estimation, Costing and Valuation	Building Materials-Construction Planning	VI	3
ACED28	Construction Engineering and Management	Building Materials-Construction Planning	VI	3
ACED29	Management in Construction	Building Materials-Construction Planning	VI	3
ACED30	Construction Scheduling	Building Materials-Construction Planning	VI	3
ACED31	Project Management: Principles, Practices and Systems	Building Materials-Construction Planning	VI	3
ACED32	Geo - Environmental Engineering	Chemistry	VI	3
ACED33	Air Pollution and Control	Not Required	VI	3
ACED34	Solid Waste Management	Chemistry	VI	3
ACED35	Construction Technology	Building Materials-Construction Planning	VI	3
ACED36	Geotechnical Engineering and Management	Geotechnical Engineering	VI	3
ACED43	Prestressed Concrete Structures	Design of Reinforced Concrete Structures	VII	3
ACED44	Structural Analysis by Matrix Methods	Strength of Materials	VII	3
ACED45	Design of Bridge Structures	Design of Reinforced Concrete Structures	VII	3
ACED46	Structural Dynamics	Strength of Materials Structural Analysis	VII	3
ACED47	Repair, Rehabilitation and Retrofitting of Structures	Design of Reinforced Concrete Structures	VII	3
ACED48	Earth Retaining Structures	Strength of Materials, Structural Analysis	VII	3
ACED49	Elements of Earthquake Engineering	Not Required	VII	3
ACED50	Design of Hydraulic Structures	Design of Reinforced Concrete Structures	VII	3
ACED51	Ground Improvement Techniques	Geotechnical Engineering	VII	3
ACED52	Stability Analysis of Slopes	Geotechnical Engineering	VI	3
ACED58	Advanced Geotechnical Engineering	Geotechnical Engineering	VIII	3
ACED59	Smart Cities Planning and Management	Not Required	VIII	3
ACED60	Watershed Management	Geotechnical Engineering	VIII	3
ACED61	Pavement Analysis and Design	Transportation Engineering	VIII	3
ACED62	Airports, Railways and Dockyards	Transportation Engineering	VIII	3

OPEN ELECTIVE COURSES (OEC)

The courses listed below are offered by the Department of CSE (AI&ML) for students of other departments.

Course Code	Course Name	Credits
ACED37	Disaster Management	3
ACED38	Environmental Impact Assessment	3
ACED53	Industrial Waste Management	3
ACED54	Environmental Pollution	3
ACED63	Smart Cities	3
ACED64	Energy Efficient Buildings	3

Value Added Courses

Objective:

Value added courses are provided to equip the students with knowledge and skills outside of the curriculum or to meet any specific requirements of the industry. The following are the Value-Added Courses provided to students by various departments in our institution.

VALUE ADDED COURSES FROM CIVIL ENGINEERING

1. Sustainable Technologies in Civil Engineering
2. Computational Fluid Dynamics using FLOW-3D
3. Modelling and animation with 3Ds Max
4. Quantity Surveying, Bar-bending Schedule

ANY FOUR FROM THE GIVEN BELOW THROUGH IARE ELRV – AKANKSHA / CERTIFICATE - SWAYAM, e-PG pathshala, NPTEL etc.

1. Data Scalability and Distribution (Amazon Web Services, Microsoft Azure, Google Cloud
2. Platform etc.
3. Software Developer (Restful webservices / Microservices, Rust programming, MEAN, MERN, MEVN)
4. Data Science (Data visualization, Data wrangling, Bigdata Technologies, Business Intelligence etc..)
5. Operating Systems (IBM I, Mac OS, Linux, Haiku etc.)
6. Debugging
7. Testing (Selenium, TestNG)
8. Cyber Security (Network Security, Threat Intelligence and Analysis / Risk Assessment and
9. Management
10. Software Architect
11. Blockchain Technology

Competency building Courses

1. AutoCAD Civil 3D
2. STAAD.Pro
3. GeoStudio
4. HEC-RAS
5. GIS Software

Career Development Courses:

1. Microsoft Project
2. Primavera
3. BIM (Building Information Modeling)
4. Tekla Structures

The components of curriculum is divided as follows

Course Component	Curriculum Content (% of total number of credits of the program)	Total Number of Contact hours	Total Number of Credits
Basic Science Courses (BSC)	11.87	21	19
Engineering Science Courses (ESC)	11.25	23	18
Humanities and Social Sciences (HSMC)	2.5	5	4
Professional Core Courses (PCC)	41.87	79	67
Professional Electives Courses (PEC)	11.25	18	18
Open Elective Courses (OEC)	5.62	09	09
Project work	8.95	28	14
Any other (Skill)	6.87	19	11
	Total number of Credits		**160**

COURSE **SYNOPSIS**

CORE **COURSES**

Probability and Statistics

Probability and Statistics quantify uncertainty and variability in data, providing tools for analysis, prediction, and decision-making across diverse fields. Probability theory models random events and outcomes, while statistics analyses data patterns and relationships to infer insights and make informed decisions. Applications range from quality control in manufacturing to risk assessment in finance and epidemiology. Probability and Statistics empower researchers, engineers, and policymakers to navigate uncertainty and optimize outcomes in complex systems and scenarios.

Strength of Materials

Strength of Materials is a cornerstone discipline in civil and mechanical engineering, focusing on the mechanical behaviour of solid materials under various loads and forces. This field encompasses the analysis of stress and strain in materials, including their response to tension, compression, torsion, and bending. By understanding material properties such as elasticity, plasticity, and strength, engineers can design and analyse structures to ensure safety, durability, and performance.

Engineering Surveying

Engineering Surveying involves the precise measurement and mapping of land and infrastructure to support the planning, design, and construction of engineering projects. Using advanced instruments and techniques, surveyors gather data on topography, property boundaries, and existing features. This information aids in site selection, alignment design, and construction layout, ensuring accuracy and compliance with regulatory requirements. Engineering surveying is essential for infrastructure development, land development, and environmental management initiatives.

Fluid Mechanics

Fluid Mechanics investigates the behaviour of fluids (liquids and gases) in motion and at rest. It encompasses principles governing fluid flow, such as continuity, momentum, and energy conservation. Fluid mechanics underpins the design of hydraulic systems, pumps, turbines, and pipelines, as well as environmental phenomena like weather patterns and ocean currents. Understanding fluid dynamics enables engineers to optimize processes, enhance performance, and mitigate risks in engineering applications.

Theory of Structures

Theory of Structures elucidates the behavior of structural elements under various loads and conditions, providing the theoretical foundation for structural analysis and design. Engineers study concepts like equilibrium, stability, and structural mechanics to understand how structures resist forces and deformations. This discipline encompasses structural analysis methods, including statics and dynamics, as well as advanced topics like matrix methods and finite element analysis. Theory of Structures underpins the safe and efficient design of buildings, bridges, and other infrastructure.

Construction Materials

Construction Materials encompass a wide range of substances used in building and infrastructure projects, including concrete, steel, wood, and asphalt. Engineers analyse material properties such as strength, durability, and thermal conductivity to select appropriate materials for specific applications. This discipline encompasses material testing, quality control, and sustainable material selection to ensure safe and efficient construction practices. Advances in construction materials, such as composite materials and recycled aggregates, drive innovation and sustainability in the construction industry.

Hydraulic Engineering

Hydraulic engineering focuses on the management and utilization of water resources. It encompasses the design, construction, and maintenance of hydraulic structures like dams, channels, and levees to control water flow, prevent flooding, and facilitate irrigation and navigation. By applying principles of fluid mechanics and hydrology, hydraulic engineers optimize water distribution systems for agricultural, industrial, and municipal purposes. Additionally, they address environmental concerns, such as erosion and habitat preservation, to ensure sustainable water management practices.

Engineering geology

Engineering geology assesses the interaction between geology and engineering projects. It involves studying rock and soil properties, geological hazards, and groundwater conditions to inform construction, infrastructure, and resource management. By analysing geological formations, engineers can mitigate risks such as landslides, earthquakes, and soil erosion, ensuring the stability and sustainability of structures like buildings, bridges, and dams. Engineering geology integrates geological principles with engineering practices to optimize project performance and minimize environmental impact.

Concrete Materials

Concrete Materials encompasses the study of concrete composition, properties, and behaviour, crucial in civil engineering. It involves understanding mix design, hydration reactions, durability factors, and structural performance. The discipline enables engineers to design, construct, and maintain durable and sustainable concrete structures for various applications.

Structural Analysis

Structural analysis techniques, experimental methods for material characterization, and considerations for engineering design are integral components of Strength of Materials. Through theoretical principles and practical applications, this discipline equips engineers with the knowledge and skills to address real-world challenges in structural design, construction, and maintenance.

Hydrology and Water Resources Engineering

Water resources engineering focuses on the sustainable management of water systems, encompassing the study of hydrology, hydraulics, and water infrastructure. Engineers assess water availability, distribution, and quality to design solutions for irrigation, flood control, and water supply projects. This discipline employs modelling techniques and environmental considerations to address challenges such as water scarcity, pollution, and climate change impacts. Water resources engineering plays a critical role in ensuring efficient and equitable utilization of this vital resource for societal and environmental benefit.

Reinforced Concrete Design

Reinforced concrete structures utilize steel reinforcement within concrete to enhance their strength and durability. This construction method offers versatility, allowing for the creation of complex shapes and efficient load-bearing structures. Engineers design reinforced concrete elements to withstand various forces, including compression, tension, and bending, making them suitable for a wide range of applications such as buildings, bridges, and dams. With proper design and construction, reinforced concrete structures offer long-term stability and resilience against environmental factors.

Soil Mechanics

Soil Mechanics focuses on the behaviour of earth materials in engineering applications. It involves the study of soil and rock mechanics, foundation design, slope stability, and underground construction. By understanding soil properties, groundwater flow, and site conditions, geotechnical engineers assess risks and design solutions for infrastructure projects such as buildings, bridges, and retaining structures. The discipline ensures the safe and sustainable development of civil engineering projects in diverse geological environments.

Design of Steel structures

Steel structures utilize steel members to create robust, versatile, and efficient building systems. These structures offer high strength-to-weight ratios, enabling spacious and column-free interior spaces. Engineers design steel structures to withstand various loads and environmental conditions, including seismic events and extreme weather. From skyscrapers and bridges to industrial facilities and residential buildings, steel structures are favored for their durability, speed of construction, and recyclability, making them a sustainable choice for modern infrastructure projects.

Foundation engineering

Foundation engineering focuses on designing and constructing the support systems that transfer structural loads to the underlying soil or rock. Engineers analyse soil properties, groundwater conditions, and structural requirements to design foundations that ensure stability, settlement control, and structural integrity. This discipline encompasses various foundation types, including shallow foundations like spread footings and deep foundations such as piles and caissons. Foundation engineering plays a critical role in the safe and efficient construction of buildings, bridges, and other structures.

Transportation Engineering

Transportation Engineering focuses on the planning, design, operation, and management of transportation systems to facilitate safe, efficient, and sustainable movement of people and goods. This discipline integrates principles from civil engineering, urban planning, and economics to address challenges related to traffic congestion, road safety, and environmental impact. Transportation engineers analyze traffic flow, optimize roadway networks, and develop innovative solutions such as intelligent transportation systems (ITS) and sustainable transportation modes. By improving mobility and accessibility, transportation engineering plays a crucial role in enhancing the quality of life and supporting economic development in communities around the world.

Environmental Engineering

Environmental engineering addresses the complex challenges of protecting and preserving the environment while meeting societal needs. It encompasses the application of engineering principles to assess and mitigate pollution, manage natural resources, and promote sustainability. Environmental engineers design systems for water and wastewater treatment, air quality control, solid waste management, and remediation of contaminated sites. By integrating technology, science, and policy, environmental engineering aims to safeguard human health, enhance ecosystems, and promote a cleaner, healthier planet for current and future generations.

PROFESSIONAL **ELECTIVES**

Remote Sensing and Geographic Information Systems (GIS)

Remote Sensing and Geographic Information Systems (GIS) utilize satellite and aerial imagery to gather spatial data for analysis and visualization. Remote sensing captures data on Earth's surface features, vegetation, and environmental changes. GIS integrates this data with geographic information for mapping, modelling, and decision-making. These technologies support diverse applications, including urban planning, natural resource management, disaster response, and environmental monitoring, facilitating informed decision-making and sustainable development initiatives globally.

Advanced Geographical Information Systems

Advanced Geographical Information Systems delves into sophisticated techniques for spatial analysis and data visualization. The course explores complex GIS methodologies, including remote sensing, spatial statistics, and geospatial modeling. Students gain expertise in leveraging GIS software to solve real-world problems in fields such as urban planning, environmental management, and disaster response. Through hands-on projects, they develop skills in spatial data manipulation and interpretation, preparing them for impactful careers in diverse industries.

Satellite Imagery in GIS

Satellite Imagery in GIS course explores the integration of satellite imagery within Geographic Information Systems (GIS). Participants learn to utilize remote sensing data for mapping, monitoring environmental changes, urban planning, and disaster management. Topics cover image acquisition, processing techniques, and interpretation methodologies. Practical applications include land use classification, vegetation analysis, and infrastructure monitoring. By mastering this course, professionals can efficiently harness satellite imagery to derive valuable insights for various spatial analysis tasks.

Geomatics Applications in Civil Engineering

Geomatics Applications in Civil Engineering explores the integration of geospatial technology in civil engineering projects. The course delves into principles of surveying, GIS (Geographic Information Systems), remote sensing, and GPS (Global Positioning System). Through theoretical knowledge and practical exercises, students learn to collect, analyze, and visualize spatial data for infrastructure planning, design, and management. The course equips learners with essential skills to enhance decision-making, optimize resource allocation, and ensure efficient project implementation in the civil engineering domain.

Green Building Technologies

"Green Building Technologies" course explores sustainable practices in construction, focusing on eco-friendly materials, energy efficiency, and waste reduction. Participants learn about green building standards, renewable energy integration, and low-impact design principles. Through case studies and practical exercises, students apply knowledge to create environmentally responsible building solutions. The course equips professionals with skills to meet growing demand for sustainable construction, promoting a greener future in the built environment.

Estimation, Costing, and Valuation

Estimation, Costing, and Valuation involve assessing project expenses, determining material quantities, and evaluating property worth. Engineers employ techniques like quantity surveying and cost analysis to estimate construction costs accurately. Valuation assesses the monetary value of assets or properties based on market conditions and factors such as location and condition. This discipline is crucial for budgeting, financial planning, and ensuring economic feasibility in construction projects and real estate transactions.

Construction Engineering and Management

Construction Engineering and Management integrates engineering principles with project management to oversee construction projects effectively. It encompasses planning, scheduling, budgeting, and resource allocation to ensure timely and cost-effective project delivery. Engineers coordinate with stakeholders, manage construction teams, and implement quality control measures.

Management in Construction

Management in Construction equips students with essential skills for overseeing building projects efficiently. The course covers project planning, budgeting, resource allocation, and risk management. Emphasis is placed on industry-specific challenges and best practices, preparing learners to navigate complex construction environments. Through case studies and practical exercises, students develop the ability to lead construction projects effectively, ensuring timely completion, cost control, and quality assurance for successful project delivery.

Construction Scheduling

Construction Scheduling provides essential knowledge and skills for effectively planning, organizing, and managing construction projects. The course covers various scheduling techniques, software tools, and best practices in project management. Participants learn to create, analyze, and adjust schedules to ensure timely completion within budget constraints. Practical applications involve real-world project scenarios, enabling students to apply learned concepts in diverse construction environments for optimized project outcomes.

Project Management: Principles, Practices and Systems

Project Management: Principles, Practices and Systems provides a comprehensive understanding of project management concepts, methodologies, and tools. The course covers key principles such as planning, execution, monitoring, and controlling projects. Students learn practical applications through case studies and real-world examples. The purpose is to equip learners with skills to initiate, plan, execute, and close projects effectively, enhancing their ability to deliver successful outcomes in various industries.

Geo-Environmental Engineering

Geo-Environmental Engineering integrates principles of geology, environmental science, and engineering to address challenges at the intersection of human activity and the natural environment. This course covers topics such as soil mechanics, hydrogeology, contaminant transport, and remediation techniques. Students learn to assess and mitigate risks associated with land development, waste management, and environmental pollution. The application of this knowledge equips professionals to safeguard ecosystems, public health, and sustainable development.

Air Pollution and Control

Air Pollution and Control addresses the sources, effects, and mitigation of air pollutants to protect human health and the environment. It involves monitoring air quality, identifying pollutant sources, and implementing control measures. Engineers design and implement technologies such as air scrubbers, catalytic converters, and emission reduction systems to minimize pollution from industrial processes, transportation, and other sources. This discipline aims to improve air quality, reduce health risks, and mitigate environmental impacts of air pollution.

Solid Waste Management

Solid Waste Management is a comprehensive course designed to equip participants with the knowledge and skills to effectively handle waste. Covering topics such as waste generation, collection, treatment, and disposal methods, it aims to promote sustainable waste management practices. Through theoretical concepts and practical applications, participants learn to mitigate environmental impact, enhance public health, and comply with regulations, contributing to a cleaner and healthier community and environment.

Construction Technology

Construction Technology is a comprehensive course focusing on modern techniques, materials, and processes used in construction projects. It covers the principles of structural design, sustainability, and safety regulations. Students learn to apply theoretical knowledge to practical scenarios, including project planning, cost estimation, and implementation of advanced construction methodologies. The course equips learners with essential skills to excel in various roles within the construction industry, from engineering to project management.

Geotechnical Engineering and Management

Geotechnical Engineering and Management is a comprehensive course integrating theory and practical applications in soil mechanics, foundation engineering, and risk management. It aims to equip students with skills to assess, design, and manage geotechnical projects efficiently. Content includes soil properties, site investigation techniques, foundation design principles, and project management strategies. Through case studies and hands-on projects, students learn to mitigate geotechnical risks and ensure the stability and sustainability of civil engineering projects.

Prestressed Concrete Structures

Prestressed Concrete Structures employ pre-applied compressive stresses to enhance their strength and durability. Engineers use high-strength steel tendons to induce these stresses, mitigating tensile forces and minimizing cracking. This construction method allows for longer spans, slimmer sections, and reduced material usage, resulting in cost-effective and aesthetically pleasing structures. Prestressed concrete finds applications in bridges, buildings, and infrastructure, offering superior performance and longevity compared to conventional reinforced concrete.

Geotechnical Engineering and Management

Structural Analysis by Matrix Methods is a course designed to equip students with the theoretical foundation and practical skills necessary for analyzing complex structures using matrix-based techniques. Covering topics such as stiffness and flexibility methods, the course delves into the mathematical principles behind structural analysis. Through hands-on exercises and real-world applications, students learn to model, simulate, and optimize structures, preparing them for careers in civil, mechanical, and aerospace engineering.

Design of Bridge Structures

The Design of Bridge Structures course provides a comprehensive understanding of bridge engineering principles, encompassing theoretical concepts, design methodologies, and practical applications. Through this course, students gain proficiency in analyzing structural requirements, selecting appropriate materials, and executing efficient design processes for various bridge types. By integrating theoretical knowledge with real-world scenarios, the course equips learners with the skills needed to design safe, functional, and innovative bridge structures.

Structural Dynamics

Structural Dynamics course explores the behavior of structures under dynamic loading, crucial for designing resilient infrastructure like bridges and buildings. The course covers concepts such as vibration analysis, response to earthquakes, and dynamic forces. Through theoretical study and practical applications, students learn to predict and mitigate structural failures, ensuring safety and efficiency in engineering projects. This knowledge empowers engineers to create structures capable of withstanding various dynamic forces encountered in real-world scenarios.

Repair, Rehabilitation and Retrofitting of Structures

Repair, Rehabilitation, and Retrofitting of Structures involve restoring, strengthening, or upgrading existing infrastructure to extend its service life and enhance performance. Engineers assess structural deficiencies, deterioration, or damage, developing tailored repair strategies to address specific issues. Techniques may include patching, strengthening with additional materials, or adding support systems. Retrofitting involves modifying structures to meet current safety standards or adapt to changing requirements, such as seismic retrofitting. These practices ensure the longevity, safety, and functionality of aging infrastructure, promoting sustainable development.

Earth Retaining Structures

Earth Retaining Structures is a comprehensive course focusing on the design, construction, and analysis of structures used to support soil or rock. It covers various retaining systems, such as retaining walls, slopes, and embankments, emphasizing their stability and functionality. Participants will learn theoretical principles and practical applications, including soil mechanics, structural engineering, and geotechnical analysis, preparing them for real-world challenges in infrastructure development and land management.

Elements of Earthquake Engineering

Elements of Earthquake Engineering offers a comprehensive overview of seismic forces, structural response, and mitigation strategies. Through theoretical concepts and practical examples, students delve into seismic design principles, analyzing structures' behavior during earthquakes, and implementing resilient engineering solutions. The course equips learners with the knowledge to design earthquake-resistant structures, ensuring safety and minimizing damage in seismic-prone regions.

Design of Hydraulic Structures

Design of Hydraulic Structures equips students with principles and methods for creating safe and efficient hydraulic systems. It covers topics such as open-channel flow, dam design, and water distribution networks. Emphasis is placed on understanding fluid mechanics, structural design, and environmental considerations. Through theoretical study and practical applications, students learn to design structures that manage water resources sustainably, ensuring safety, efficiency, and environmental protection in various engineering projects.

Ground Improvement Techniques

Ground Improvement Techniques aim to enhance the engineering properties of soil to support construction projects. Methods include compaction, soil stabilization, and soil reinforcement to increase bearing capacity, reduce settlement, and mitigate liquefaction risks. Grouting, vibro-compaction, and deep soil mixing are common techniques employed to improve soil stability and strength. These methods are crucial for building on weak or problematic soils, ensuring the safety, stability, and longevity of infrastructure projects.

Stability Analysis of Slopes

Stability Analysis of Slopes examines the factors influencing the stability of natural and engineered slopes. Topics include soil mechanics, slope geometry, and environmental conditions affecting stability. Through theoretical analysis and practical case studies, students learn methods for assessing slope stability, such as limit equilibrium and finite element analysis. The course aims to equip engineers with the skills to identify, evaluate, and mitigate slope instability risks in geotechnical and civil engineering projects, ensuring safety and sustainability.

Advanced Geotechnical Engineering

Advanced Geotechnical Engineering delves into complex topics beyond the fundamentals of soil mechanics and foundation engineering. It covers advanced concepts such as soil-structure interaction, consolidation theory, and geotechnical earthquake engineering. Through theoretical study, laboratory experiments, and case studies, students explore sophisticated analysis techniques and innovative design methods for challenging geotechnical problems. The course aims to prepare engineers to address intricate geotechnical issues in infrastructure development, ensuring resilient and sustainable construction practices in diverse geological conditions.

Smart Cities Planning and Management

Smart Cities Planning and Management integrates technology, data, and urban planning principles to create efficient, sustainable, and urban environments. It involves deploying IoT sensors, data analytics, and digital infrastructure to optimize resource utilization, enhance mobility, and improve public services. Smart city initiatives prioritize citizen engagement, environmental sustainability, and economic development, leveraging innovation to address urban challenges and enhance quality of life for residents.

Watershed Management

Watershed Management explores the integrated approach to sustainably managing the land and water resources within a watershed. It covers topics such as hydrology, soil conservation, land use planning, and ecosystem management. Through interdisciplinary study and fieldwork, students learn to assess, plan, and implement strategies for watershed protection and restoration. The course aims to equip professionals with the knowledge and skills to address water quality, flood control, and biodiversity conservation issues, promoting resilience and sustainability in watershed ecosystems.

Pavement Analysis and Design

Pavement Analysis and Design involves evaluating the structural integrity and performance of road surfaces to ensure safe and durable transportation infrastructure. Engineers analyze traffic loads, environmental conditions, and material properties to design pavement structures that withstand traffic demands and environmental stresses. Methods include mechanistic-empirical modelling, pavement layer analysis, and performance prediction. By optimizing pavement designs and materials, this discipline enhances road safety, reduces maintenance costs, and extends the service life of roadways.

Airports, Railways, and Dockyards

Airports, Railways, and Dockyards focuses on the planning, design, and management of transportation infrastructure systems. It covers principles of airport layout and design, railway track and terminal design, and dockyard facilities planning. Through case studies and real-world projects, students learn about the technical, operational, and safety considerations unique to each mode of transportation. The course aims to prepare professionals to address the challenges of increasing demand, sustainability, and safety in the planning and management of transportation hubs.

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