

CAYMET's

Siddhant College of Engineering

SavitribaiPhule Pune University, Pune

Third Year Civil Engineering (2019 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Subject Code & Name -301001: Hydrology and Water Resource Engineering

Course objectives

1. To introduce students to different government organizations and make them aware about precipitation, runoff, runoff hydrographs and streams gauging.
2. To introduce the concept of reservoir planning, capacity of reservoir, economics of reservoir, floods, hydrologic routing and use of Q-GIS software in hydrology.
3. To impart knowledge of irrigation, crop water requirement, canal distribution network, piped distribution network, revenue collection, ground water hydrology, water logging, and drainage and water management.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Understand government organizations, apply & analyze precipitation & its abstractions.
2. Understand, apply & analyze runoff, runoff hydrographs and gauging of streams.
3. Understand, apply & analyze floods, hydrologic routing & Q-GIS software in hydrology.
4. Understand, apply & analyze reservoir planning, capacity of reservoir & reservoir economics.
5. Understand water logging & water management, apply & analyze ground water hydrology
6. Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement.

Subject Code & Name -301002: Water Supply Engineering

Course objectives

1. To make students understand importance of water infrastructure with respect to needs of various users.
2. To discuss and demonstrate the principles of water treatment plant and layout.
3. To inculcate and impart design principles and working of WTP components
4. To interpret need of contemporary issues in water treatment.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Define identify, describe reliability of water sources, estimate water requirement for various sectors
2. Ascertain and interpret water treatment method required to be adopted with respect to source and raw water characteristics
3. Design various components of water treatment plant and distribution system.
4. Understand and compare contemporary issues and advanced treatment operations and process available in the market, including packaged water treatment plants.
5. Design elevated service reservoir capacity and understand the rainwater harvesting.
6. Understand the requirement of water treatment plant for infrastructure and Government scheme.

Subject Code & Name -301003: Design of Steel Structures

Course objectives

1. This course is designed to provide understanding of IS code provisions, fundamentals of structural steel design and its applications for design of various components.
2. Students should be able to understand components of steel structures and its arrangements

3. Student should be able to design beams, columns, column footings, roof trusses, gantry girder and plate girders

Course outcomes

On successful completion of this course, the learner will be able to:

1. Demonstrate knowledge about the types of steel structures, steel code provisions and design of the adequate steel section subjected to tensile force.
2. Determine the adequate steel section subjected to compression load and design of built up columns along with lacing and battening.
3. Design eccentrically loaded column for section strength and column bases for axial load and uniaxial bending.
4. Design of laterally restrained and unrestrained beam with and without flange plate using rolled steel section.
5. Analyze the industrial truss for dead, live and wind load and design of gantry girder for moving load.
6. Understand the role of components of welded plate girder and design cross section for welded plate girder including stiffeners and its connections.

Subject Code & Name -301004: Engineering Economics and Financial Management

Course objectives

1. To apply the knowledge of accounting and financial management in civil engineering projects.
2. To prepare, appraise, evaluate, and approve financial plans and interpret financial data.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Understand basics of construction economics.
2. Develop an understanding of financial management in civil engineering projects.
3. Prepare and analyze the contract account.
4. Decide on right source of fund for construction projects.
5. Understand working capital and its estimation for civil engineering projects.
6. Illustrate the importance of tax planning & understand role of financial regulatory bodies.

Subject Code & Name-301005 a: Elective I: Advanced Fluid Mechanics and Hydraulic Machines

Course objectives

1. To study flow over notches and weirs; and the concept of hydraulic jump and losses
2. To state the importance of ideal fluid flow analysis.
3. To study laminar flow between parallel plates.
4. To study unsteady flow through orifice and the concept of water hammer in pipe flow
5. To study impact of free jet on stationary and moving flat and curved vanes
6. To study Pelton wheel, Francis turbine and centrifugal pump from view point of their working principle, work done, efficiency and performance characteristics.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Determine discharge using notches and weirs, and energy loss in hydraulic jump in open channel flow.
2. Describe simple superpositions of basic ideal fluid flows; and determine velocity and shear stress distribution for laminar flow between parallel plates.
3. Understand flow through openings under varying head, and determine rise in pressure due to water hammer effect in pipe flow.
4. Calculate force exerted by free jet on stationary and moving, flat and curved vanes using impulse momentum principle.
5. Design Pelton wheel and Francis turbines and predict their performance characteristics.
6. Estimate performance characteristics of Centrifugal pump

Subject Code &Name -301005 b: Elective I: Research Methodology and IPR

Course Objectives

1. The course has been developed with orientation towards research related activities and recognizing the ensuing knowledge as property.
2. It will create consciousness of research methodology, which will be useful to develop a research culture in the young minds.
3. Learners will be able to perform documentation and administrative procedures relating to IPR in India as well as abroad

Course outcomes

On successful completion of this course, the learner will be able to:

1. Understand a research problem for civil engineering domain.
2. Analyze the available literature for given research problem and illustrate different techniques of literature survey thereby gap identification.
3. Recognize the importance of data collection and investigate the statistical and reliability methods of preliminary data analysis.
4. Explain the important concept of interpretation and develop technical writing and presentation skills.
5. Comprehend the various forms of the intellectual property, its relevance and business impact in the changing global business environment.
6. Realize the importance of patents, trademark and copyright and follow research ethic

Subject Code &Name 301005 c: Elective I: Construction Management

Course Objectives

1. To understand various construction activities and evaluating construction projects.
2. To handle all situations with knowledge of various labour laws and financial aspects of construction projects.
3. To know about risk management and value engineering
4. To utilize material and human resources efficiently with managerial skills interpersonal and intrapersonal skills.
5. To apply knowledge of artificial intelligence on construction project

Course Outcomes

On successful completion of this course, the learner will be able to:

1. Understand the overview of construction sector.
2. Illustrate construction scheduling, work study and work measurement.
3. Acquaint various labor laws and financial aspects of construction projects.
4. Explain elements of risk management and value engineering.
5. State material and human resource management techniques in construction.
6. Understand basics of artificial intelligence techniques in civil engineering.

Subject Code &Name-301005 d: Elective I: Advanced Concrete Technology

Course objectives

1. To provide an advanced understanding on cement chemistry, influence of supplementary cementitious materials, and effect of admixtures on properties of concrete
2. To illustrate the role of fibers and understand the durability properties of concrete
3. To study advanced testing methods on concrete

Course outcomes

On successful completion of this course, the learner will be able to:

1. Understand the chemistry of cement and its effect on properties of concrete
2. Apply the knowledge of supplementary cementitious materials to produce sustainable concretes
3. Understand the mechanism of working of admixtures and their effect on properties of concrete
4. Evaluate the characteristic properties of fiber reinforced concrete
5. Understand the durability properties of concrete
6. Interpret the properties of concrete through advance testing methods

Subject Code &Name -301005 e: Elective I: Matrix Methods of Structural Analysis

Course objectives

1. To understand the structural behavior of beams, plane frames by analyzing using flexibility method of analysis.
2. To generate element/member stiffness matrix, transformation matrix and global/structure stiffness matrix for the skeletal structures and analyze the structure using stiffness method.
3. To develop program algorithm/flowcharts applying the concepts of member approach of stiffness method to analyze skeletal structures and forming base for the study of Finite element method

Course outcomes

On successful completion of this course, the learner will be able to:

1. To understand the structural behavior of bars and trusses and analyze it by using flexibility method of analysis.
2. To understand the structural behavior of beams and plane frames and analyze it by using flexibility method of analysis.
3. To analyze bars, springs and truss by member approach of stiffness matrix method.
4. To analyze beams by member approach of stiffness matrix method and to develop transformation matrix and global/structure stiffness matrix for plane frame and thereby analyze it by member approach of stiffness matrix method.
5. To develop transformation matrix and global/structure stiffness matrix for grid and analyze the grid by structure and member approach of stiffness matrix method.
6. To develop the member stiffness matrix of space truss and space frame and develop the flow chart /algorithm to write the program for analysis of skeletal structures with reference to computer application

Subject Code &Name -301005 f: Elective I: Advanced Mechanics of Structures

Course objectives

1. To learn the concept of moment area and conjugate beam method to find slope and deflection
2. To study different type of stresses in thin and thick cylindrical shells
3. To learn application of influence line diagram to find the forces in the members due to moving load
4. To study the analysis of beams and arches

Course outcomes

On successful completion of this course, the learner will be able to:

1. Apply moment area and conjugate method to find slope and deflection.
2. Evaluate stresses and strain in thin and thick cylinder.
3. Analyze the beam and trusses by influence line diagram.
4. Analyze the beam for moving load by influence line diagram.
5. Understand and analyze beam curved in plan and elevation.
6. Analyze three and two hinged arches for axial thrust, shear and moment

Subject Code &Name -301006: Seminar

Course objectives

1. Identify technical / practical problems in the field of civil engineering.
2. Inculcate the ability to describe, interpret and analyze technical content.
3. Develop competence in preparing report which will enhance critical thinking and develop the skill of technical writing along with presentation.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Appraise the current civil engineering research / techniques / developments / interdisciplinary areas.
2. Review and organize literature survey utilizing technical resources, journals etc.
3. Evaluate and draw conclusions related to technical content studied.
4. Demonstrate the ability to perform critical writing by preparing a technical report.
5. Develop technical writing and presentation skills.

Subject Code &Name-301011 a: Audit Course I: Professional Ethics and Etiquettes

Course objectives

1. To create awareness on professional ethics and human values.
2. To provide basic familiarity about Engineers as responsible experimenters, research ethics, codes of ethics, industrial standards.
3. To inculcate knowledge and exposure on safety and risk.
4. To expose students to right attitudinal and behavioral aspects.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Understand the basic perception of profession, professional ethics, various moral issues and uses of ethical theories
2. Understand various social issues, industrial standards, code o ethics and role of professional ethics in engineering field.
3. Follow ethics as an engineering professional and adopt good standards and norms of engineering practice.
4. Apply ethical principles to resolve situations that arise in their professional lives

Subject Code &Name-301011 b: Audit Course I: Sustainable Energy Systems

Course objectives

1. To understand the impact of engineering solutions on a global, economic, environmental and societal context.
2. To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.

Course outcomes

On successful completion of this course, the learner will be able to:

1. To demonstrate an overview of the main sources of renewable energy.
2. To understand benefits of renewable and sustainable energy systems.

SEM-II

Subject Code &Name -301012: Waste Water Engineering

Course objectives

1. To introduce students about the need of sanitation infrastructure, wastewater treatment, sludge management system and to identify potential of wastewater for recycle and reuse
2. To inculcate an ability to learn the working principle, operation and design of various units of wastewater treatment plant

Course outcomes

On successful completion of this course, the learner will be able to:

1. Recall sanitation infrastructure, quantification and characterization of wastewater, natural purification of streams
2. Design preliminary and primary unit operations in waste water treatment plant
3. Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process
4. Understand and design suspended and attached growth wastewater treatment systems
5. Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment systems
6. Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment

Subject Code &Name -301013: Design of Reinforced Concrete Structures

Course objectives

- 1 To provide the students with basic concepts of reinforced concrete structures.
- 2 To analyze, design and detailing of different component of reinforced concrete structures.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel & concrete.
2. Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections.
3. Design & detailing of rectangular one way and two-way slab with different boundary conditions
4. Design & detailing of dog legged and open well staircase
5. Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion.
6. Design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.

Subject Code &Name -301014: Remote Sensing and Geographic Information System

Course objectives

1. To comprehend fundamentals and principles of RS and GIS techniques.
2. To enhance students' capacity to interpret images and extract information of earth surface from multi-resolution imagery at multi-scale level.
3. To develop skills of Image processing and GIS
4. To utilize RS and GIS techniques in Engineering Geology and civil engineering.
5. To study satellite image processing, satellite image interpretation, digitization and generation of thematic maps in a GIS.
6. To learn buffering and layer analysis for civil engineering applications.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Articulate fundamentals and principles of RS techniques.
2. Demonstrate the knowledge of remote sensing and sensor characteristics.
3. Distinguish working of various spaces-based positioning systems.
4. Analyze the RS data and image processing to utilize in civil engineering
5. Explain fundamentals and applications of RS and GIS

6. Acquire skills of data processing and its applications using GIS

Subject Code &Name -301015 a: Elective II: Advanced Engineering Geology with Rock Mechanics

Course objectives

1. To apply geological principles in various phases of civil engineering projects.
2. To develop ability to carry out independently civil engineering and geological investigations.
3. To choose and compare the site conditions leading to their suitability and to treat geological defects to achieve the economy.
4. To highlight geophysical explorations and their applications in geology.
5. To understand fundamentals of rock mechanics and application part of units.
6. To assess the methods required for geological investigations for tunnels, bridges, and dams.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Illustrate seismic zones, plate tectonics and civil engineering significance of major rock formations of India with their characteristics.
2. Explain soil profile, geo-hydrological characters of various rock formations and necessity of geological studies in water conservation.
3. Apply knowledge of geology in Infrastructural, Urban development and demonstrate importance of national wealth.
4. Validate the suitability of rocks based on mechanical properties, R.Q.D. and geophysical exploration.
5. Explore subsurface Geology for civil engineering projects to suggest foundation treatments for various geological defects and channel erosion.
6. Illustrate the suitability of proposed alignments for tunnels and bridges on the basis of Geological investigations

Subject Code &Name -301015 b: Elective II: Soft Computing Techniques

Course objectives

1. To make students aware about soft computing techniques
2. To impart knowledge about components and training of ANN
3. To introduce students to important aspects of neural network design
4. To introduce students to neural network types and its application
5. To impart knowledge about working of genetic algorithms and Support vector regressions along with their applications
6. To impart knowledge about working of model tree and random forest along with their applications

Course outcomes

On successful completion of this course, the learner will be able to:

1. Understand AI techniques, soft computing techniques and basic concepts Artificial Neural Network
2. Understand components of ANN, training algorithms and implement the back propagation algorithm
3. Design the feed forward back propagation neural network.
4. Understand types of neural networks and their applications
5. Understand working of genetic algorithm, support vector regressions, model tree and random forest along with their applications
6. Develop models for time series applications using support vector regressions, model tree and random forest

Subject Code &Name -301015 c: Elective II: Advanced Surveying

Course objectives

1. To understand the advance surveying techniques and instruments.
2. To interpret the advanced surveying measurements.
3. To execute the ground as well as aerial mapping.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Recognize the concept of triangulation for fixing the ground control points.
2. Differentiate most probable values for different measurement and adjust those in a given figure.
3. Summarize the concepts of astronomical and hydrographic surveying.
4. Demonstrate the use of aerial photographs for mapping.
5. Analyze use of modern surveying instruments in the field.
6. Execute GPS and the associated software for different applications in civil engineering.

Subject Code &Name -301015 d: Elective II: Advanced Geotechnical Engineering

Course objectives

1. To learn the classification of soil, soil structure, role of water in clay, earth pressure on retaining structures and the design of retaining structures.
2. To study types of triaxial tests and draw the stress paths.
3. To know methods to implement soil stabilization and different ground improvement techniques

Course outcomes

On successful completion of this course, the learner will be able to:

1. Classify the soil and understand the soil structure and role of water in clay.
2. Calculate lateral pressure on retaining structures and carry out design the retaining structures.
3. Interpret the results of triaxial tests under different drainage conditions.
4. Draw the stress paths for different conditions.
5. Select and implement soil stabilization techniques based on field conditions.
6. Explain different ground improvement techniques.

Subject Code &Name -301015 e: Elective II: Architecture and Town Planning

Course objectives

1. To use principles of architectural planning and understand futuristic need of users.
2. To discuss and demonstrate the concepts of landscaping, urban renewal and sustainable architecture
3. To distinguish and relate planning levels and understand use of act and to develop neighborhood plan
4. To interpret need of civic surveys for DP proposal and value planning agencies and ITS
5. To understand and demonstrate planning strategy with reference to different acts, guidelines, norms.
6. To appraise multifaceted zones like SEZ, CRZ and Special township, understand applications of modern Tools like GIS / GPS / RS in town planning and need of Rural Planning

Course outcomes

On successful completion of this course, the learner will be able to:

1. Apply the principles of architectural planning and landscaping for improving quality of life
2. Understand the confronting issues of the area and apply the acts.
3. Evaluate and defend the proposals.
4. Appraise the existing condition and to develop the area for betterment

Subject Code &Name -301015 f: Elective II: Solid Waste Management

Course objectives

1. To understand problems of solid waste, estimate and characterize the solid waste and apply the knowledge of laws for municipal solid waste management for handling of MSW.
2. To understand government initiatives for management of solid waste, to apply the knowledge of mathematics, science, and engineering for effective solid waste collection systems, for waste collection route optimization and its economics.
3. To understand processing of solid waste, material recovery facility and to design composting systems, maintain and operate composting process for effective organic waste recycling.
4. To understand working of waste to energy system and to design of bio-methnation and incineration system.
5. To design & manage construction and operations of landfill facilities and management of legacy solid waste.
6. To understand management and legal requirements of special waste and reuse, recycle and material recovery from solid waste.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Outline solid waste management systems with respect to its generation rate (quantity), sampling, characteristics and regulatory/legal requirements.
2. Explain and suggest relevant method of storage, collection and transportation of solid waste for the given site condition with justification.
3. Develop understanding of technological applications for processing and material recovery from solid waste with its economics and design composting system for organic waste.
4. Describe the fundamental and technological aspects of waste to energy systems from solid waste and to design anaerobic digester and incineration system.
5. Outline the design, operation, and maintenance of sanitary landfill and management of legacy waste.
6. Explain the functional element for management of special waste and suggest the relevant method of reuse and recycling for the given type of waste in the given situation

Subject Code &Name -301016: Internship**Course objectives**

1. To encourage and provide opportunities for students to get professional/personal experience through internships.
2. To learn to apply the technical knowledge gained from academics /classroom learning in real life/industrial situations.
3. To get familiar with various tools and technologies used in industries and their applications.
4. To enable students to develop professional skills and expand their professional network with the development of employer-valued skills like teamwork, communication.
5. To apply the experience gained from industrial internship to the academic course completion project.
6. To nurture professional and societal ethics in students
7. Understand the social, economic and administrative considerations that influence the working environment of industrial organizations

Course outcomes

On successful completion of this course, the learner will be able to:

1. To develop professional competence through industry internship
2. To apply academic knowledge in a personal and professional environment
3. To build the professional network and expose students to future employees
4. Apply professional and societal ethics in their day to day life
5. To become a responsible professional having social, economic and administrative considerations
6. To make own career goals and personal aspiration.
