Department of Civil Engineering
K. K. Wagh Institute of Engineering Education and Research
Hirabai Haridas Vidyanagari, Amrut Dham, Panchavati, Nashik-422003

Vision and Mission

Vision	Imparting quality technical education in civil engineering for infrastructural development and meeting the needs of society.
Mission	**M1**: To develop Civil Engineers having knowledge, attitude and skills for effective implementation of good construction practices.
	M2: To mould the Civil Engineering graduates to become global leaders who will lead the eco-friendly construction for sustainable development.
	M3: To inculcate the work culture and ethics among the Civil Engineering graduates for planning, designing and execution of construction project with quality and economy.
	M4: To provide testing and consultancy services in Civil Engineering for quality control and infrastructure development of the region.

Program Objectives

Program Educational Objectives (PEOs)	**PEO1**: Excellence in civil engineering education, research and profession by acquiring knowledge in mathematics, basic sciences, computer and other relevant engineering disciplines.
	PEO2: Understanding real life problems and field conditions, analysis and design of the systems to find technically sound, economically feasible and socially acceptable solutions.
	PEO3: Acquiring advanced technical and professional knowledge in various fields of civil engineering meeting the related ordinances, codes of practices, regulations and standards, and keeping track of the latest trend in the civil engineering profession.
	PEO4: Development in professional and ethical practices, communication skills, team work in their profession and adapt to current trends by updating technical knowledge and to prepare the graduates for engineering public service examination and self employment.

Program Specific Outcomes (PSOs)	After successfully completion of the program the students will be able to:
	PSO1: Plan, analyze, design and prepare drawings of various civil engineering projects as per the needs of an individual and society for sustainable development.
	PSO2: Prepare estimates, cost economics and project management schedule of the civil engineering projects and carry out construction as per design, specifications and drawings.

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Program Outcomes

Program Outcome	After the successful completion of the program Civil Graduates will be able to
PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes

Class- Second Year of Engineering Semester I	
Course : Engineering Mathematics III	
COs	**After successful completion of course a student should be able to**
CO207001.1	Solve higher order linear differential equations and apply to modelling and analyzing bending of beams
CO207001.2	Solve systems of linear equations and apply using different numerical techniques and develop solution to ordinary differential equations using single step and multistep methods.
CO207001.3	Apply statistical methods in analyzing and interpreting experimental data and probability theory applied to construction management
CO207001.4	Recognize nature of vector fields, use different vector differential operators & evaluate line, surface & volume integrals & its applications.
CO207001.5	Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
Course : Building Technology and Materials	
COs	**After successful completion of course a student should be able to**
CO201001.1	Identify buildings, structures and their components.
CO201001.2	Explain types of masonry, formwork, casting procedure and necessity of underpinning and scaffolding.
CO201001.3	State different types of flooring and roofing materials.
CO201001.4	Describe types of doors, windows, arches and lintel.
CO201001.5	Illustrate means of vertical circulation and protective coatings.
CO201001.6	Apply different materials especially eco-friendly materials and safety measures to be adopted at any construction site.
Course : Strength of Material	
COs	**After successful completion of course a student should be able to**
CO201002.1	Demonstrate the stress-strain for elastic, plastic & brittle material and describe different type of stresses in determinate, indeterminate, homogeneous and composite structures
CO201002.2	Formulate the equation of bending and shear stresses and its application for different section
CO201002.3	Derive the equations and determine torsional stresses and stresses due to

	strain energy for different loading conditions.
CO201002.4	Explain the concept of principal planes and principal stresses for combined loading and its diagrammatic representation
CO201002.5	Construct loading diagram, Shear Force Diagram (SFD) and Bending Moment Diagram (BMD).
CO201002.6	Assess critical load for axially and eccentrically loaded column and its resultant stresses.
Course: Geotechnical Engineering	
COs	**After successful completion of course a student should be able to**
CO201003.1	Identify and classify the soil based on the index properties and its formation process.
CO201003.2	Explain permeability and seepage analysis of soil by construction of flow net
CO201003.3	Illustrate the effect of compaction on soil and understand the basics of stress distribution.
CO201003.4	Express shear strength of soil and its measurement under various drainage conditions.
CO201003.5	Evaluate the earth pressure due to backfill on retaining structures by using different theories.
CO201003.6	Analysis of stability of slopes for different types of soils and explain Geo-environmental with respect to contamination, its effects and its remedial measures.
Course: Surveying	
COs	**After successful completion of course a student should be able to**
CO201006.1	State the need of surveying for any civil engineering work and operate the various surveying instruments for measurements of bearing and distances.
CO201006.2	To apply the knowledge of leveling for determination of the elevation of the various points, drawing longitudinal sections and cross sections of alignments.
CO201006.3	Measure horizontal and vertical angles and determine coordinates.

CO201006.4	Carry out contour survey and prepare contour maps.
CO201006.5	Able to work out the elements of different types of curves & its setting out in the field.
CO201006.6	Collect the data from the SBPS system & setting out the civil engineering work.
Semester II	
Course: Fluid Mechanics I	
COs	**After successful completion of course a student should be able to**
CO201004.1	Define fluid properties, explain and illustrate dimensional analysis to solve problems of fluid flow.
CO201004.2	Apply concept of pressure head and forces acting on a body submerged in fluid for solving fluid statics problem.
CO201004.3	Define and identify type of flow and compute flow parameters.
CO201004.4	Recall law of conservation of energy and apply it to various devices and flow problems to quantify discharge.
CO201004.5	Understand the theory of laminar and turbulent flow and its application in formation of boundary layer.
CO201004.6	Define head loss and implement it for designing pipes to carry particular amount of discharge.
Course: Architectural Planning and Design of Buildings	
COs	**After successful completion of course a student should be able to**
CO201005.1	Apply the knowledge of Town planning & List documents from commencement to completion of Building.
CO201005.2	Design the Environmental friendly building according to Architectural planning principles by considering different rules.
CO201005.3	Analyze the data and plan different types of residential structures by using building bylaws
CO201005.4	Identify the defects in building and Plan building accordingly.
CO201005.5	Apply knowledge to plan residential Building.
CO201005.6	Apply the knowledge to plan the different types of Public Buildings

Course : Concrete Technology	
COs	**After successful completion of course a student should be able to**
CO201007.1	Describe concrete as a construction material and discuss about the ingredients of concrete like cement, fly ash, aggregates and admixtures.
CO201007.2	Discuss the properties of fresh concrete. Prepare and test the fresh concrete.
CO201007.3	Discuss the properties of hardened concrete. Test hardened concrete with destructive and non destructive testing instruments.
CO201007.4	Identify concrete related equipments and describe various concreting techniques. Discuss about special concretes.
CO201007.5	Design concrete mix of desired grade.
CO201007.6	Assess deteriorations in concrete and categorize different methods and techniques of repairing it.
Course : Structural Analysis-I	
COs	**After successful completion of course a student should be able to**
CO201008.1	Identify determinate and indeterminate structures statically and kinematically and to find slope and deflection of joints of statically determinate structures.
CO201008.2	Illustrate structural behaviour of fixed beams, continuous beams, propped cantilevers and frames & their analysis.
CO201008.3	Analysis of determinate and indeterminate trusses.
CO201008.4	Apply the concept of influence line diagram for the analysis of structure under moving load
CO201008.5	Interpret two hinged and three hinged arch mechanisms and their analysis.
CO201008.6	Describe plastic behaviour of mild steel and apply the concept of plastic hinge formation for the analysis of determinate, indeterminate beams and single bay single storied portal frame.
Course : Engineering Geology	
COs	**After successful completion of course a student should be able to**
CO207009.1	Get knowledge about the basic concepts of engineering geology. Shall also able to differentiate and to relate between the different rock types, their inherent characteristics and uses in civil engineering constructions.

CO207009.2	Recognition and Identification of rocks on the basis of various physical, mechanical properties of minerals both in lab and on the fields and will learn to differentiate and judge between favorable and unfavorable conditions for the buildings, roads, dams, tunnels etc.
CO207009.3	Estimation of the importance of mass wasting processes and various tectonic processes that hampers the design of civil engineering projects and its implications on environment and sustainability.
CO207009.4	Evaluate, analyze and to interpret geo hydrological characters of the rocks present at the foundations of the dams, percolation tanks, tunnels.
CO207009.5	Assessment and Importance of Seismic activities and its effect on the civil engineering construction and be able to map the various geological hazards.
CO207009.6	Managing and trying to get command over the various remote sensing software.
Course : Soft Skills	
COs	**After successful completion of course a student should be able to**
CO201010.1	Make use of techniques for self-awareness and self-development.
CO201010.2	Explore the soft skills such as communication skills,speaking skills,Demonstration through class activity
CO201010.3	Apply business etiquette skills effectively an engineer requires to incorporate life -Demonstration of etiquettes through YouTube films
CO201010.4	Understand the importance of teamwork and group discussions skills.
CO201010.5	Learn the Leadership qualities and its responsibilities.
CO201010.6	Develop time management and stress management concept for personal and career goals.
Class- Third Year of Engineering- Semester I	
Course : Hydrology and Water Resources Engineering	
COs	**After successful completion of course a student should be able to**
CO301001.1	Apply the knowledge of hydrology for analysis of precipitation and discharge measurement.
CO301001.2	List various methods of irrigation to describe water requirement of crops for assessment of canal revenue.

CO301001.3	Describe distribution of ground water to measure yield from aquifers to support well irrigation.
CO301001.4	Apply the knowledge of basic fundamental for developing hydrograph and to analyze the frequency of floods for interpretation of real life situation with mathematical formulation.
CO301001.5	Express terms related to reservoir planning for developing mass curve and demand curve to compare various methods of flood routing.
CO301001.6	Use rotational water supply system for water distribution and apply the knowledge of water logging to formulate preventive and curative measure for water logged areas.
Course : Infrastructure Engineering	
COs	**After successful completion of course a student should be able to**
CO301002.1	Identifying the scope of Infrastructure Engineering in forthcoming projects related to smart cities, railways at national and global level.
CO301002.2	Discuss types of rail joints, effects, remedial measures, curves and maintenance of track.
CO301002.3	Describe necessity of mechanization, dewatering techniques, purpose and construction methods of diaphragm walls and prefabrication techniques.
CO301002.4	Illustrate different types and functions of tunneling and underlining in detail the drainage and ventilation in tunneling.
CO301002.5	Recognize requirements of Harbors and ports, studying their design criteria and methods of construction.
CO301002.6	Study and categorize various types of construction equipment and evaluate their economic maintenance and cost of repair.
Course : Structural Design - I	
COs	**After successful completion of course a student should be able to**
CO301003.1	Interpret different design philosophies and relevant IS provisions to ensure safety and serviceability of the structure and discuss material behavior of structural steel
CO301003.2	Identify modes of failure and design axially and eccentrically loaded

	compression members along with their connections
CO301003.3	Apply and design suitable type of column base subjected to axial load and uni-axial bending
CO301003.4	Design of laterally supported and unsupported beams for flexure and shear and design of appropriate connections
CO301003.5	Design of welded plate girder including stiffeners and connections
CO301003.6	Design of Gantry Girder
CO301003.7	Evaluate different loads acting on roof truss and design different members of roof truss along with connections
Course : Structural Analysis-II	
COs	**After successful completion of course a student should be able to**
CO301004.1	Recall the concept of fixed end moments, slope & deflection equations & to apply it for the analysis of indeterminate beams, sway, non-sway portal frames.
CO301004.2	Express the knowledge of moment distribution method for the analysis of indeterminate beams & frames.
CO301004.3	Formulate flexibility matrix for the analysis of indeterminate beams, frames and trusses.
CO301004.4	Formulate stiffness matrix for the analysis of indeterminate beams, frames and trusses.
CO301004.5	Application of central finite difference method to determine the deflections in determinate beam and analysis of 2-D rigid jointed frames by using approximate methods.
CO301004.6	Explain the fundamentals of finite element method and compose shape functions for 1-D/2-D element.
Course : Fluid Mechanics-II	
COs	**After successful completion of course a student should be able to**
CO301005.1	Understand and describe the basic fundamentals of fluid flow around submerged objects, open channel flow, hydraulic machinery, hydropower generation and gradually varied flow.

CO301005.2	Apply the knowledge of basics for designing the objects submerged in fluid flow, open channel in field.
CO301005.3	Conduct the experiments in the laboratory to verify the designs and derive the equations.
CO301005.4	Evaluate and inspect the execution, performance and functioning of the open channel
CO301005.5	Evaluate and inspect the execution, performance and functioning of hydraulic machinery.
CO301005.6	Apply the knowledge of basics for designing the gradually Varied Flow in open channel in field.
Course : Employability Skill Development	
COs	**After successful completion of course a student should be able to**
CO301006.1	Explain employability skills, its need and career planning.
CO301006.2	Discuss interpersonal skills, decision making skill and problem solving skill.
CO301006.3	Develop presentation, communication skills and differentiate C.V. , Bio data and Resume.
CO301006.4	Value professional Etiquettes, manners and personal skills.
Semester II	
Course : Advanced Surveying	
COs	**After successful completion of course a student should be able to**
CO 301007.1	Differentiate between conventional methods of surveying and advanced techniques
CO 301007.2	Explain Hydrographic surveying, sounding equipment's, methods of locating boat position and application of hydrographic surveying.
CO 301007.3	Interpret the various remote sensing images and explain the importance of GIS application in Civil Engineering.
CO 301007.4	Estimate the most probable value of various surveying quantities.
CO	Recognize the modern methods of Aerial Photogrammetry and Digital

301007.5	Photogrammetry
CO 301007.6	Describe Trigonometric leveling and setting of engineering works for Civil Engineering projects like bridge and tunnel construction
Course : Project Management and Engineering Economics	
COs	**After successful completion of course a student should be able to**
CO301008.1	Identify the need and importance of Project Management & organization structure.
CO301008.2	Apply the basics of CPM and PERT networks for finding critical path and time required for the project completion
CO301008.3	Recognize the objective importance and its field application of material management.
CO301008.4	Demonstrate various technics of resource allocation and resource levelling
CO301008.5	Recognize economic of construction project
CO301008.6	Appraise the best project using various appraisal methods.
Course : Foundation Engineering	
COs	**After successful completion of course a student should be able to**
CO 301009.1	Select proper method for site investigation and get true sub soil parameters.
CO 301009.2	Explain allowable bearing capacity of soil with respect to different theories and effect of various parameters like depth, width, GWT & density of soil.
CO 301009.3	Analysis of settlement of soil/soil structure with respect to magnitude and duration of settlement.
CO 301009.4	Evaluation of load carrying capacity of individual piles by different methods & determine efficiency of group of piles with respect to configurations.
CO 301009.5	Analysis and design of sheet pile structures and select proper foundation and construction techniques for black cotton soil.
CO 301009.6	Judge behaviour of reinforced soil, its application in civil engineering & effect of earthquake on soil structure.

Course : Structural Design - II	
COs	**After successful completion of course a student should be able to**
CO301010.1	Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel & concrete.
CO301010.2	Recognize modes of failure as per LSM and evaluate moment of resistance for singly, doubly and flanged sections.
CO301010.3	Design rectangular one way and two way slab with different boundary conditions
CO301010.4	Design dog legged and open well staircase
CO301010.5	Design singly/doubly reinforced and flanged beams for flexure, shear, bond and torsion by using IS Code coefficients/ moment distribution or Redistribution methods
CO301010.6	Design Short Columns subjected to axial load, uni-axial/bi-axial bending and their isolated footings
Course : Environmental Engineering I	
COs	**After successful completion of course a student should be able to**
CO301011.1	State the sources and effects of noise pollution, air pollution and municipal solid waste, measurement and control of noise pollution, air pollution and municipal solid waste.
CO301011.2	Describe the components of water supply scheme, to estimate the water requirement of a city/town considering domestic and non domestic demand also analyze rate of water consumption and quality aspects of water for drinking purpose;
CO301011.3	Evaluate the treatment flow sheet for treatments of raw water from various sources also apply the principle of treatment processes for design of aeration and sedimentation tank.
CO301011.4	Apply the principle of treatment processes for design of various water treatment units like coagulation, flocculation and filtration.
CO301011.5	State the mechanism of disinfection and the need of advanced water treatment of water, theory and working of these methods.

CO301011.6	Demonstrate different package water treatment plants, components of water distribution systems, water conservation and rainwater harvesting.
Course : Seminar	
COs	**After successful completion of course a student should be able to**
CO301012.1	State the introduction of the topic, its relevance to the construction industry, need for the study, aims and subjunctives, limitations.
CO301012.2	Describe literature review from books, journals, conference proceedings, published reports, articles to understand the concept.
CO301012.3	Express experiments done, projects, organizations visited for studying materials, equipment, technologies used.
CO301012.4	Prepare theoretical chapter on the topic of study, advantages and limitations.
CO301012.5	Concluding remarks with respect to commercial/ practical and social applications.
CO301012.6	Design and present their work precisely in front of examiner.
Class- Final Year of Engineering- Semester I	
Course : Environmental Engineering II	
COs	**After successful completion of course a student should be able to**
CO401001.1	Analyze the characteristics of domestic sewage, explain self purification of polluted river and design of sewers for collection and conveyance of sewage to treatment plant.
CO401001.2	Design various primary treatment units on the basis of theory of primary treatment.
CO401001.3	Design appropriate aerobic method for secondary treatment of sewage.
CO401001.4	Evaluate and design different low cost methods for sewage treatment
CO401001.5	Explain the theory of anaerobic digestion, different anaerobic treatment processes and design of septic tank including disposal system.
CO401001.6	Describe the sources and characteristics of industrial waste water, select suitable methods for treatment for different industrial wastewater and reuse and recycle of treated wastewater.

Course : Transportation Engineering	
COs	**After successful completion of course a student should be able to**
CO401002.1	Tell the types of roads / highways, planning process of highways and various studies required for finalization of highway alignment.
CO401002.2	Describe the various components of highway alignment and demonstrate the geometric design of horizontal and vertical alignment of highway.
CO401002.3	Collect the data required for traffic planning, control & regulation.
CO401002.4	Choose the appropriate material for road construction
CO401002.5	Demonstrate the design of flexible and rigid pavements.
CO401002.6	Compare the different methods of construction of bituminous and concrete roads and modern trends in highway construction and maintenance.
Course : Structural Design - III	
COs	**After successful completion of course a student should be able to**
CO401003.1	Analysis of prestress, bending stresses and assessment of loss of prestress.
CO401003.2	Design of prestressed concrete beam, one way and two way slab.
CO401003.3	Design of prestressed concrete flat slab by Direct Design method.
CO401003.4	Analysis and design of soil retaining structures.
CO401003.5	Analysis and design of liquid retaining structures.
CO401003.6	Explain the basics of structural dynamics and design of multi-storey framed structure after evaluating it for seismic and gravity forces.
Course : Systems Approach in Civil Engineering (Elective I)	
COs	**After successful completion of course a student should be able to**
CO401004.1	Discuss the application of various Optimization Techniques through systems approach to civil engineering project.
CO401004.2	Compute the elapsed time and idle time for various engineering processes.
CO401004.3	Apply concept of Transportation and Assignment Model to compute the cost of an optimum route between various sources and destination.

CO401004.4	Formulate Linear optimization models for Civil engineering problems and obtain optimum solution.
CO401004.5	Apply appropriate nonlinear programming techniques to obtain optimum solution
CO401004.6	Predict cost and profit of strategy using dynamic programming and game theory and assess the useful life using replacement model technique.
Course : Earthquake Engineering (Elective II)	
COs	**After successful completion of course a student should be able to**
CO401005.1	Distinguish various parameters related to earthquake and learning from failures due to past earthquakes.
CO401005.2	Formulate the equations of damped/undammed SDOF systems by applying the concept of mathematical model and extend the concept for MDOF systems.
CO401005.3	Analysis of multistoried structure by seismic coefficient method.
CO401005.4	Dynamic analysis of multistory structure and interpret the effects of different parameters.
CO401005.5	Analysis of multistory frame structure subjected to seismic and gravity forces and design of intermediate level beam.
CO401005.6	Discuss various control systems, disaster management and propose appropriate method of retrofitting to strengthen the structure.
Course : Project	
CO401006.1	Identify the problem and its impact on engineering system and society.
CO401006.2	Study the relevant literature for understanding status of research on the topic and research gap if any.
CO401006.3	Develop methodology for arriving solution of the problem.
CO401006.4	Evaluate different alternatives and design of technically feasible and economical solution.
CO401006.5	Demonstrate the practical application in the field.
CO401006.6	Prepare the project report and present the work before the examiners.

Semester II	
Course : Dams and Hydraulic Structures	
CO401007.1	Identify different types of dam and know its component part. Make aware with classification of dams through field visit. Application of pressure measuring device in Health monitoring of dam
CO401007.2	Design gravity dam. Conduct stability analysis of gravity dam. explain concept of arch & buttress dam
CO401007.3	Design of spillway. Design Energy Dissipation device. Explain Concept of Hydro power plant
CO401007.4	Design of spillway and able know its application. Design the weirs on permeable foundation
CO401007.5	Introduce the types of canals. Design canal and lined canal
CO401007.6	Demonstrate various types of C D works and canal structures through field visit.
Course : Quantity Surveying, Contracts and Tenders	
CO401008.1	State different types of estimates in civil engineering and understand the methods for measurement of building works.
CO401008.2	Describe PWD procedure for execution of major/minor work, details required in tender notice and tender documents for execution of major / minor construction works.
CO401008.3	Explain different types of contracts, various conditions of contracts for execution of civil engineering works and arbitration methods in civil engineering.
CO401008.4	Prepare approximate and detailed estimate of different types of civil engineering works.
CO401008.5	Determine the rate per unit of measurement for various construction items and compose the detailed specifications for various items.
CO401008.6	Evaluate depreciation and value of a property on the basics of present condition, specifications and market trend.
Course : Hydropower Engineering (Elective III)	
CO401009.1	Recognise different types of power resources
CO401009.2	Identify different types of hydro power

CO401009.3	Calculate load for residential building and for plant
CO401009.4	Recognise different components of water conductor system
CO401009.5	Design Impulse and reaction turbine and recognize different parameters necessary for turbine smooth functioning
CO401009.6	Recognise economy of hydro power plant
Course : Air Pollution & Control (Elective III)	
CO401009.1	Acquire knowledge about control of Indoor air quality and odor pollution
CO401009.2	Describe various principles of control equipments of air pollution.
CO401009.3	Describe environmental rules, regulations & different environmental Act.
CO401009.4	Identify, predict and assess the environmental impact due to setting up of engineering project.
CO401009.5	Analyze ambient air & stack gas quality for preserving environmental conditions.
CO401009.6	Estimate air pollution concentration at receptor level on the basis of meteorological conditions
Course : Airport and Bridge Engineering (Elective III)	
CO401009.1	Tell the different component parts of airplane, airport, heliport and bridges.
CO401009.2	Explain terms related to airport, heliport and Bridges.
CO401009.3	Solve the issues related to site selection by using the knowledge of different criteria of airport, heliport and bridges.
CO401009.4	Categorize different types of bridges; explain the different planning aspects of Airport and Bridge Engineering.
CO401009.5	Justify the planning of airport /heliport site by providing Air travel demand forecasting.
CO401009.6	Plan the Airport site layout, design Runway and Taxiway.
Course : Plumbing (Elective IV)	
CO401010.1	Define Plumbing Engineering, understand and implement relevant codes related to Plumbing Engineering.

CO401010.2	Describe Water Supply fixtures and fittings. Identify various plumbing fixtures and fittings and their working.
CO401010.3	Discuss sanitary system and Building drainage system. Compare water supply system and building drainage system.
CO401010.4	Identify various types of traps and interceptors. Illustrate vent requirement and parts of vent system.
CO401010.5	Examine the Plumbing in High rise building. Compare between plumbing in residential buildings, with high rise building.
CO401010.6	Design water supply system and sewer network using Plumbing drawings.
Course : Construction Management (Elective IV)	
CO401010.1	Discuss various components of Infrastructure development, Construction management, project management, project monitoring and reporting systems.
CO401010.2	Describe application of various Artificial Intelligence Techniques in civil engineering project.
CO401010.3	Explain various Labour laws for labour safety and welfare and discuss the financial aspects of Construction project.
CO401010.4	Illustrate the Risk Management and Value Engineering techniques.
CO401010.5	Apply scheduling techniques and Work Study methods for construction projects.
CO401010.6	Apply Materials and Human Resource Management principles to construction projects.