VARDHAMAN
COLLEGE OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING

List of Course Outcomes

Semester No:	I Year-I Sem (R25)		
Course Title:	Matrices and Calculus	**Course Code:**	A9001
Course Outcome No.	**Course Outcome Statement**		
CO1	Solve system of equations using rank of a matrix.		
CO2	Construct the canonical form of a quadratic form using orthogonal transformations.		
CO3	Express a function in series by mean value theorems and evaluate improper integrals using Beta and Gamma functions.		
CO4	Examine the extremum of a function of several variables.		
CO5	Apply multiple integrals to find the areas and volumes.		
Course Title:	Engineering Chemistry	**Course Code:**	A9009
Course Outcome No.	**Course Outcome Statement**		
CO1	Analyse the hardness and other impurities present in the water for industrial and domestic applications.		
CO2	Apply electrochemical principles to protect the metals from corrosion.		
CO3	Illustrate the types of energy sources along with their characteristics and applications.		
CO4	Differentiate the properties of various polymeric materials based on their structure and engineering applications.		
CO5	Compare the materials to study various physical and chemical properties.		
Course Title:	Programming for Problem Solving	**Course Code:**	A9501
Course Outcome No.	**Course Outcome Statement**		
CO1	Use basic programming constructs and control statements to design solutions for computational problems.		
CO2	Develop programs using arrays and strings to store and manipulate sequential data.		
CO3	Implement modular programming using functions, structures, and unions to manage complex problems and data.		
CO4	Make use of pointers and le handling to effectively manage and process data.		
CO5	Choose appropriate searching and sorting technique to organize and retrieve data efficiently.		

Course Title:	English for Skill Enhancement	**Course Code:**	A9011
Course Outcome No.	**Course Outcome Statement**		
CO1	Identify and use appropriate vocabulary to compose and deliver clear oral and written communication		
CO2	Practice adept usage of grammar for effective communication		
CO3	Interpret and summarize known and unknown passages		
CO4	Develop proficiency in writing for academic purposes		
CO5	Demonstrate basic proficiency in professional correspondence		
Course Title:	Engineering Drawing	**Course Code:**	A9301
Course Outcome No.	**Course Outcome Statement**		
CO1	Construct various types of engineering scales and curves used in technical drawings.		
CO2	Interpret and create orthographic projections of points, lines, and planes with varying inclinations.		
CO3	Generate orthographic views of regular solids, inclined to one or both reference planes.		
CO4	Analyze sectional views of regular solids to construct true shape of the section, and lateral surface development.		
CO5	Produce isometric views of objects and convert between isometric and orthographic projections.		
Course Title:	Engineering Chemistry Laboratory	**Course Code:**	A9010
Course Outcome No.	**Course Outcome Statement**		
CO1	Apply the instrumental techniques to find out the strength of solutions.		
CO2	Analyze the impurities present in the water using volumetric analysis.		
CO3	Make use of different titrimetric methods to measure chemical species.		
CO4	Analyze the importance of temperature and pressure on physical properties of liquids.		
CO5	Calculate the yield of synthesized compounds by maintaining appropriate reaction conditions.		
Course Title:	Programming for Problem Solving Laboratory	**Course Code:**	A9502
Course Outcome No.	**Course Outcome Statement**		
CO1	Make use of fundamental programming constructs to develop solutions for computational problems.		
CO2	Perform various operations on arrays and strings to effectively organize, process, and manipulate sequential data in programs.		
CO3	Develop programs with functions and structures to design modular programs that efficiently handle and process data.		
CO4	Apply pointers and file handling techniques to implement programs for storing and managing data effectively.		
C05	Implement searching and sorting algorithms to efficiently organize and access data.		

Course Title:	English Language and Communication Skills Laboratory	**Course Code:**	A9012
Course Outcome No.	**Course Outcome Statement**		
CO1	Acquire the received pronunciation and speak in a neutral accent		
CO2	Use language effectively in real-life situations		
CO3	Demonstrate effective use of non verbal communication		
CO4	Interpret visual data for oral communication		
CO5	Develop the ability to enhance listening skills		
Course Title:	Engineering Workshop	**Course Code:**	A9302
Course Outcome No.	**Course Outcome Statement**		
CO1	Demonstrate the ability to perform fundamental workshop trades, including fitting, carpentry, welding, and plumbing, by completing a variety of hands-on tasks.		
CO2	Demonstrate safe and effective usage of fabrication tools and digital equipment.		
CO3	Identify and operate common workshop machines and tools while strictly adhering to safety protocols and quality management practices.		
CO4	Recognize the properties of different materials and select appropriate tools and processes for specific manufacturing applications.		
CO5	Fabricate a complete, functional assembly by integrating multiple skills learned across different workshop trades.		
Course Title:	Community Centered Design Thinking	**Course Code:**	A9021
Course Outcome No.	**Course Outcome Statement**		
CO1	Apply the principles of design thinking, empathy, and sustainability to identify and understand real-world community challenges.		
CO2	Conduct field research surveys and observation to dene community-based problem statements.		
CO3	Ideate creative solutions using appropriate tools and techniques to meet the identified community needs.		
CO4	Collaborate with community members, NGOs, and peers to test, rene, and validate design solutions through feedback and co-design processes.		

Semester No:	I Year-II Sem (R25)		
Course Title:	Ordinary Differential Equations and Vector Calculus	**Course Code:**	A9002
Course Outcome No.	**Course Outcome Statement**		
CO1	Make use of first order differential equations to solve real world problems.		
CO2	Solve ordinary differential equations of higher order.		
CO3	Apply Laplace transforms to solve ordinary differential equations.		
CO4	Determine divergence and curl of a vector point function.		
CO5	Compute line, surface, and volume integrals and convert them into one another using appropriate theorems.		
Course Title:	Engineering Physics	**Course Code:**	A9007
Course Outcome No.	**Course Outcome Statement**		
CO1	Apply quantum mechanical principles to understand the particle behavior and formation of energy bands in solids.		
CO2	Analyze semiconductor properties and explain the operation of PN junction diode and their applications.		
CO3	Apply quantum gates to design quantum circuits and implement fundamental quantum algorithms.		
CO4	Analyze magnetic and dielectric properties relevant to modern technological applications.		
CO5	Apply laser and fibre optic principles to communication and sensing technologies.		
Course Title:	Engineering Geology	**Course Code:**	A9101
Course Outcome No.	**Course Outcome Statement**		
CO1	Illustrate the significance of geology in civil engineering and identify minerals based on physical properties.		
CO2	Classify the rocks based on their megascopic properties.		
CO3	Identify and interpret geological structures such as folds, faults, joints, and unconformities with reference to their impact on construction projects.		
CO4	Analyze the causes and effects of earthquakes and landslides, and explain the working principles and applications of geophysical methods in civil engineering.		
CO5	Evaluate geological considerations related to the selection and stability of dam, reservoir, and tunnel sites.		
Course Title:	Applied Mechanics	**Course Code:**	A9102
Course Outcome No.	**Course Outcome Statement**		
CO1	Apply the laws of mechanics to evaluate different types of forces and moments acting on a rigid body.		
CO2	Solve problem of bodies subjected to friction.		
CO3	Determine centroid and centre of gravity of standard and composite sections.		
CO4	Evaluate area moment of inertia of standard and composite sections.		
CO5	Utilise principles of kinematics and kinetics to solve numerical problems.		

Semester No:	I Year-II Sem (R25)		
Course Title:	Ordinary Differential Equations and Vector Calculus	**Course Code:**	A9002
Course Outcome No.	**Course Outcome Statement**		
Course Title:	Building Materials, Construction and Planning	**Course Title:**	A9103
Course Outcome No.	**Course Outcome Statement**		
CO1	Identify different masonry construction.		
CO2	Make use of advanced materials for sustainable environment.		
CO3	Explain the functional requirements of building components and finishing works.		
CO4	Interpret building bye-laws and regulations.		
CO5	Plan different types of buildings including their service and safety.		
Course Title:	Engineering Physics Laboratory	**Course Title:**	A9008
Course Outcome No.	**Course Outcome Statement**		
CO1	Determine key parameters of LEDs and solar cells from their IV characteristics.		
CO2	Apply the Hall Effect to determine the type of semiconductor and estimate the density of majority charge carriers.		
CO3	Evaluate material properties including energy band gap, magnetic moment, dielectric constant, and magnetic hysteresis behavior.		
CO4	Apply the principles of lasers and optical fibres to determine laser wavelength and Numerical Aperture.		
CO5	Apply principles of mechanical waves to determine AC supply frequency.		
Course Title:	Engineering Geology Laboratory	**Course Title:**	A9104
Course Outcome No.	**Course Outcome Statement**		
CO1	Identify and describe common minerals based on their physical properties.		
CO2	Understand the different types of minerals used in the industries.		
CO3	Identify and classify rocks through megascopic examination.		
CO4	Interpret geological maps and draw geological sections.		
CO5	Solve simple Structural Geology problems.		

Course Title:	Computer Aided Engineering Graphics	**Course Title:**	A9304
Course Outcome No.	**Course Outcome Statement**		
CO1	Analyze the basic drawing and editing tools to create and modify 2D sketches.		
CO2	Interpret the projection principles to draw points and lines in different quadrants.		
CO3	Compare the projected views of planes to identify their true shape and inclination.		
CO4	Apply the orthographic projection principles to construct two-dimensional views of solids.		
CO5	Construct isometric views by applying principles derived from orthographic drawings.		
Course Title:	Product Design and Development	**Course Title:**	A9022
Course Outcome No.	**Course Outcome Statement**		
CO1	Explain the principles of product design and the product development life cycle, with an emphasis on addressing real-world community needs		
CO2	Generate and evaluate innovative product concepts using relevant Hardware and Software design tools		
CO3	Develop functional prototypes using appropriate prototyping tools, and perform initial testing and validation		
CO4	Rene prototypes through iterative feedback loops, integrating sustainability and user-centered design principles		
CO5	Document and communicate product designs effectively with comprehensive specifications and user manuals tailored for community stakeholders		

Semester No:	II Year-I Sem (R25)		
Course Title:	Business Economics and Financial Analysis	**Course Title:**	A9014
Course Outcome No.	**Course Outcome Statement**		
CO1	Analyze business and economic concepts to assess their impact on the overall economic environment.		
CO2	Examine the relationship between demand, supply, and elasticity in understanding market behavior.		
CO3	Apply production, cost, market structure, and pricing concepts to interpret business operations and competitive strategies.		
CO4	Apply accounting principles and rules for preparing financial statements.		
CO5	Analyze financial statements and capital budgeting techniques to evaluate the financial health of a business.		

Course Title:	Concrete Technology	**Course Title:**	A9105
Course Outcome No.	**Course Outcome Statement**		
CO1	Identify Quality Control tests on concrete making materials.		
CO2	Evaluate the workability of fresh concrete through various tests.		
CO3	Determine the mechanical strength properties of hardened concrete.		
CO4	Determine the durability properties of concrete.		
CO5	Design concrete mixes as per IS code and explore special concretes for construction.		
Course Title:	Strength of Materials	**Course Title:**	A9106
Course Outcome No.	**Course Outcome Statement**		
CO1	Explain concepts and principles related to the strength of materials.		
CO2	Develop shear force and bending moment diagrams of beams for different support conditions.		
CO3	Apply theory of simple bending and shear stress concepts on various sections.		
CO4	Analyse beams for slope and deflections using different methods.		
CO5	Estimate the principal stresses using analytical and graphical methods.		
Course Title:	Surveying and Geomatics	**Course Title:**	A9107
Course Outcome No.	**Course Outcome Statement**		
CO1	Understand the basics and principles of chain and compass surveying.		
CO2	Apply levelling techniques to determine elevations and compute earthwork quantities.		
CO3	Make use of theodolite and tacheometer for angle and distance measurements.		
CO4	Apply trigonometric methods for height and distance measurements and curve setting.		
CO5	Utilze advanced tools like Total Station, GPS, Remote Sensing, and GIS in surveying.		
Course Title:	Fluid Mechanics	**Course Title:**	A9108
Course Outcome No.	**Course Outcome Statement**		
CO1	Outline the properties of fluids and pressures associated with fluids.		
CO2	Interpret key concepts of fluid kinematics and dynamics to solve problems in a fluid flow.		
CO3	Apply Bernoulli's equation to study ow measurements in pipes, notches, and weirs.		
CO4	Examine flows and losses through pipes.		
CO5	Analyse the boundary layer effect on the laws of fluid.		

Course Title:	Strength of Materials Laboratory	**Course Title:**	A9109
Course Outcome No.	**Course Outcome Statement**		
CO1	Evaluate properties of the material by tensile test.		
CO2	Determine compressive and flexural strength of materials.		
CO3	Analyse properties of material by impact test.		
CO4	Estimate properties of the material by using hardness test.		
CO5	Make use of strain gauges and find the strain for a material.		
Course Title:	Surveying and Geomatics Laboratory	**Course Title:**	A9110
Course Outcome No.	**Course Outcome Statement**		
CO1	Conduct chain surveying and handle obstacles during chaining.		
CO2	Perform compass surveying to determine bearings and distances.		
CO3	Utilize plane table methods for plotting and mapping.		
CO4	Perform levelling operations and profile plotting.		
CO5	Apply theodolite techniques for angle measurement.		
Course Title:	Python Programming Laboratory	**Course Title:**	A9511
Course Outcome No.	**Course Outcome Statement**		
CO1	Interpret basic programming constructs and control statements to solve simple computational problems		
CO2	Apply string operations and regular expressions to process and manipulate text.		
CO3	Make use of data structures lists, tuples, sets, and dictionaries to store and organize data effectively.		
CO4	Implement modular programming concepts using functions, modules, and le handling techniques.		
CO5	Develop applications using exception handling constructs to handle runtime errors in software applications.		
Course Title:	Computer Aided Building Drafting	**Course Title:**	A9111
Course Outcome No.	**Course Outcome Statement**		
CO1	Represent building materials and components.		
CO2	Plan residential building and represent all the building components.		
CO3	Illustrate elevation and sectional views of residential building.		
CO4	Construct plan, elevation, and sectional views of public building.		
CO5	Draft plan, elevation, and sectional views of an overhead water tank		

Course Title:	Technology Entrepreneurship	**Course Title:**	A9023
Course Outcome No.	**Course Outcome Statement**		
CO1	Identify and analyze market opportunities for community-driven technological innovations.		
CO2	Apply intellectual property strategies for protecting product designs and innovations.		
CO3	Develop sustainable and scalable business models for product commercialization.		
CO4	Formulate funding, financial, and go-to-market strategies for product launch.		
CO5	Prepare and deliver investor-ready pitches or patent documentation to relevant stakeholders.		

Semester No:	II Year-II Sem (R25)		
Course Title:	Probability Distributions and Statistics	**Course Title:**	A9004
Course Outcome No.	**Course Outcome Statement**		
CO1	Identify an appropriate probability distribution for a given discrete or continuous random variable.		
CO2	Make use of probability distributions to analyze and solve a given problem.		
CO3	Interpret correlation coefficient and perform regression analysis to fit the best curve.		
CO4	Inspect scientific hypothesis and estimate confidence intervals at different levels.		
CO5	Compute P-value of a test statistic using component of hypothesis test.		
Course Title:	Structural Mechanics	**Course Title:**	A9112
Course Outcome No.	**Course Outcome Statement**		
CO1	Compute torsional stresses in shafts and deflections in helical springs.		
CO2	Evaluate critical loads and stability of columns using Euler's and Rankine's methods.		
CO3	Determine stresses in members under combined axial and bending loads.		
CO4	Assess stress distribution and dimensional changes in thin and thick cylinders.		
CO5	Apply concepts of unsymmetrical bending in locating shear centres in structural sections.		

Course Title:	Hydraulics and Hydraulic Machines	**Course Title:**	A9113
Course Outcome No.	**Course Outcome Statement**		
CO1	Explain the fundamentals of open channel flows.		
CO2	Demonstrate an understanding of non-uniform channel ow and hydraulic jump.		
CO3	Evaluate the model and prototype relations by similarity laws and basics of turbomachinery.		
CO4	Apply the fundamentals of fluid forces to understand the functioning and technical aspects of hydraulic turbines.		
CO5	Analyse the possible problems, performance and installation techniques of centrifugal pumps.		
Course Title:	Water Resources Engineering	**Course Title:**	A9114
Course Outcome No.	**Course Outcome Statement**		
CO1	Interpret various components of hydrologic cycle for the management of water resources.		
CO2	Analyse initial abstractions of precipitation, runoff and hydrographs.		
CO3	Determine flood discharge, flood routing methods and flood control structure.		
CO4	Estimate aquifer parameters and flow to wells.		
CO5	Assess crop water requirement, irrigation techniques and design discharge of a water course.		
Course Title:	Structural Analysis	**Course Title:**	A9115
Course Outcome No.	**Course Outcome Statement**		
CO1	Determine the indeterminacy of structures.		
CO2	Analyse the different types of arches.		
CO3	Apply energy theorems to beams and trusses.		
CO4	Evaluate the fixed beams under various loads.		
CO5	Assess the continuous beams and frames by the displacement method.		
Course Title:	Fluid Mechanics and Hydraulic Machines Laboratory	**Course Title:**	A9317
Course Outcome No.	**Course Outcome Statement**		
CO1	Demonstrate the classical experiments in fluid mechanics and hydraulic machinery.		
CO2	Correlate various ow measuring devices such as Venturimeter and orifice meter.		
CO3	Discuss the performance characteristics of turbines and pumps.		
CO4	Estimate energy losses and boundary layer parameters for laminar and turbulent flows.		
CO5	Demonstrate the classical experiments in fluid mechanics and hydraulic machinery.		

Course Title:	Building Information Modeling Laboratory	**Course Title:**	A9116
Course Outcome No.	**Course Outcome Statement**		
CO1	Apply the fundamental concepts of Building Information Modeling (BIM).		
CO2	Utilize various editing tools, ribbons, rendering tools of Revit.		
CO3	Develop plan and elevation of building.		
CO4	Model various components of building.		
CO5	Document project drawings using Revit.		
Course Title:	Concrete Technology Laboratory	**Course Title:**	A9117
Course Outcome No.	**Course Outcome Statement**		
CO1	Assess different physical properties of cement.		
CO2	Determine different properties of aggregate.		
CO3	Evaluate fresh concrete by conducting different workability tests.		
CO4	Examine mechanical properties of the hardened concrete.		
CO5	Demonstrate non-destructive testing procedures on concrete.		
Course Title:	Computational Mathematics Laboratory	**Course Title:**	A9006
Course Outcome No.	**Course Outcome Statement**		
CO1	Develop the code to find the Eigen values and Eigen Vectors using Python/MATLAB		
CO2	Develop the code to find solution of Algebraic and Transcendental using Python/MATLAB		
CO3	Develop the code to find solution of Linear system of equations using Python/MATLAB		
CO4	Write the code to solve problems of First-Order linear differential equations with constant coefficients		
CO5	Write the code to solve problems of Higher order linear differential equations with constant coefficients		
Course Title:	Digital Surveying	**Course Title:**	A9118
Course Outcome No.	**Course Outcome Statement**		
CO1	Make use of advanced surveying instruments.		
CO2	Measure angles and distances.		
CO3	Interpret field notes and survey data.		
CO4	Determine elevations/heights of various structures.		
CO5	Establish setting out works like buildings and highways.		

Course Title:	Community Driven Product Evaluation	**Course Title:**	A9024
Course Outcome No.	**Course Outcome Statement**		
CO1	Apply structured evaluation frameworks to assess technical, functional, and social impact of products.		
CO2	Conduct community-centered product testing and collect actionable feedback.		
CO3	Benchmark products against industry standards and competitor solutions.		
CO4	Analyze evaluation data to identify strengths, weaknesses, and areas for improvement.		
CO5	Integrate knowledge from all prior courses to produce a comprehensive commercialization or patent readiness report.		

HOD-CIV