# COURSE LEARNING OUTCOMES (CLOs)
# B.Sc CIVIL ENGINEERING PROGRAM

| CLOs | CLO Statement<br>At the end of this course, students will be able to: | PLOs | Bloom's |
|---|---|---|---|
| **Engineering Drawing (CE-101) Theory** | | | |
| CLO-1 | **Describe** basics of engineering drawing. | PLO-1 | C-1 |
| CLO-2 | **Explain** fundamentals of architectural, structural, plumbing, and electrical drawings. | PLO-1 | C-2 |
| **Engineering Drawing (CE-101) Practical** | | | |
| CLO-1 | **Perform** the tasks related to engineering drawing. | PLO-9 | P-2 |
| CLO-2 | **Explain** basic concepts of engineering drawing. | PLO-2 | C-2 |
| CLO-3 | **Justify** application of concepts related to engineering drawing. | PLO-10 | A-3 |
| **Engineering Mechanics (CE-102) Theory** | | | |
| CLO-1 | **Describe** the basic concepts of equilibrium and explain their application in civil engineering. | PLO-1 | C-2 |
| CLO-2 | **Apply** fundamental concepts of statics & kinematics for analyzing forces in statically determinate structures. | PLO-2 | C-3 |
| **Engineering Mechanics (CE-102) Practical** | | | |
| CLO-1 | **Perform** the experiments related to engineering mechanics. | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data. | PLO-2 | C-2 |
| CLO-3 | **Justify** application of experiments related to engineering mechanics. | PLO-10 | A-3 |
| CLO-4 | **Demonstrate** function of project, prepared on basic principles of engineering mechanics. | PLO-9 | P-3 |
| **Engineering Geology (CE-103) Theory** | | | |
| CLO-1 | **Describe** basic concepts of geology, formation of rocks and structural features of strata | PLO-1 | C-1 |
| CLO-2 | **Apply** knowledge of geology in civil engineering | PLO-1 | C-3 |
| **Engineering Geology (CE-103) Practical** | | | |
| CLO-1 | **Perform** the experiments related to engineering geology | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| CLO-3 | **Justify** application of experiments related to engineering geology | PLO-10 | A-3 |

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| **Surveying-I (CE-104) Theory** | | | |
| CLO-1 | **Explain** various principles and techniques of basic surveying | PLO-1 | C-2 |
| CLO-2 | **Apply** various techniques to calculate parameters required for plotting survey maps | PLO-2 | C-3 |
| **Surveying-I (CE-104) Practical** | | | |
| CLO-1 | **Perform** the experiments related to basic surveying | PLO-9 | P-2 |
| CLO-2 | **Plot** area maps using experimental data from modern tools | PLO-5 | C-4 |
| CLO-3 | **Justify** application of experiments related to surveying | PLO-10 | A-3 |
| **Mathematics-I (MA-105)** | | | |
| CLO-1 | **Acquire** knowledge related to basic concepts of calculus, statistics, and ODEs | PLO-1 | C-2 |
| CLO-2 | **Apply** concepts for analysis and solution of engineering related problems | PLO-2 | C-3 |
| **Surveying-II (CE-106) Theory** | | | |
| CLO-1 | **Explain** principles and application of advanced surveying. | PLO-1 | C-2 |
| CLO-2 | **Apply** various survey techniques for traversing and setting out of curves. | PLO-2 | C-3 |
| **Surveying-II (CE-106) Practical** | | | |
| CLO-1 | **Perform** and **Demonstrate** the experiments related to advanced surveying | PLO-9 | P-3 |
| CLO-2 | **Execute** the plotting of area maps using modern tools based on experimental data | PLO-5 | P-2 |
| CLO-3 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| **Engineering Materials (CE-107) Theory** | | | |
| CLO-1 | **Discuss** basic properties of civil engineering materials for environmentally sustainable construction. | PLO-7 | C-2 |
| CLO-2 | **Conduct** selection of materials according to various requirements. | PLO-4 | C-3 |
| **Engineering Materials (CE-107) Practical** | | | |
| CLO-1 | **Perform** experiments related to engineering materials. | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data. | PLO-2 | C-3 |
| CLO-3 | **Clarify** application of experiments related to engineering materials. | PLO-6 | A-2 |

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| **Professional Ethics (CE-108)** | | | |
| CLO-1 | **Identify** the content of religious, national, or international law dealing with engineering ethics. | PLO-6 | C-2 |
| CLO-2 | **Apply** the knowledge of ethics in their personal and professional life | PLO-8 | C-3 |
| CLO-2 | Gain the ability to enhance key factors of interpersonal relations | PLO-12 | A-2 |
| **Mathematics-II (MA-109)** | | | |
| CLO-1 | **Acquire** knowledge related to basic concepts of calculus, statistics, and ODEs | PLO-1 | C-2 |
| CLO-2 | **Apply** concepts for analysis and solution of engineering related problems | PLO-2 | C-3 |
| **Pakistan Studies (HU-110)** | | | |
| CLO-1 | **Describe** important historical event, geographical demarcation and to state deep understanding about past events and future learning. | PLO-12 | C1 |
| CLO-2 | **Analyze** the revival of Islamic Society in the changing world Environment in context of political and constitutional history of Pakistan | PLO-6 | C4 |
| CLO-3 | Gain basic understanding of contemporary socio-political and environmental structure of Pakistan and **compare** different social issues. | PLO-7 | C4 |
| **Professional English (CE-111)** | | | |
| CLO-1 | **Apply** the acquire knowledge and skill of communication in their respective fields of engineering | PLO-9 | C3 |
| CLO-2 | Consolidate and extend students' vocabulary and grammar, that will enable them to **present** and **contribute** towards drafting of text effectively | PLO-10 | A2 |
| **Fluid Mechanics-I (CE-201) Theory** | | | |
| CLO-1 | **Explain** the basic concepts of fluid at rest and motion. | PLO-1 | C-2 |
| CLO-2 | **Apply** fundamental concepts for problem solving in fluid statics and kinematics. | PLO-2 | C-3 |
| **Fluid Mechanics-I (CE-201) Practical** | | | |
| CLO-1 | **Perform** experiments related to basic fluid mechanics. | PLO-9 | P-2 |
| CLO-2 | **Estimate** the hydraulic parameters using experimental data. | PLO-2 | C-3 |
| CLO-3 | **Justify** experiments related to basic fluid mechanics. | PLO-10 | A-3 |

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| **Properties of Concrete (CE-202) Theory** | | | |
| CLO-1 | **Discuss** materials, activities and problems related to concrete. | PLO-1 | C-2 |
| CLO-2 | **Implement** concrete mix designs considering various parameters using standard guidelines. | PLO-3 | C-3 |
| **Properties of Concrete (CE-202) Practical** | | | |
| CLO-1 | **Perform** experiments related to properties of concrete. | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data. | PLO-2 | C-3 |
| CLO-3 | **Justify** application of experiments related to properties of concrete. | PLO-10 | A-3 |
| **Engineering Practice (CE-203) Theory** | | | |
| CLO-1 | **Describe** the knowledge about construction equipment, construction projects and methodologies | PLO-1 | C-2 |
| CLO-2 | **Justify** the concepts of construction engineering in different situations | PLO-1 | A-2 |
| CLO-3 | **Demonstrate** knowledge of construction engineering on civil engineering projects | PLO-11 | C3 |
| **Engineering Practice (CE-203) Practical** | | | |
| CLO-1 | **Demonstrate** the construction activities of civil engineering projects | PLO-11 | P-3 |
| CLO-2 | **Execute** the assigned task reliably independent of help | PLO-11 | C-3 |
| CLO-3 | **Justify** advanced techniques and different latest equipment used in construction | PLO-5 | A-3 |
| **Numerical Analysis and Computer Programing (MA-204) Theory** | | | |
| CLO-1 | **Apply** numerical analysis techniques for simpler to complex problems of applied engineering. | PLO-2 | C-3 |
| **Numerical Analysis and Computer Programing (MA-204) Practical** | | | |
| CLO-1 | **Apply** analytical tools in solving engineering as well as daily life problems. | PLO-5 | C-6 |
| **Islamic Studies (HU-205)** | | | |
| CLO-1 | **Discuss** fundamentals of Quran, A'hadees and their values in everyday life. | PLO-6 | A-1 |
| CLO-2 | **Recognize** the importance of Islamic architecture in modern day engineering considering social and religious aspects/interests. | PLO-6 | C-1 |
| CLO-3 | **Discuss** as well as interpret the social and religious aspects of Islamic ethics. | PLO-8 | A-2 |

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| **Hazards and Disaster Management (CE-212)** | | | |
| CLO-1 | **Explain** hazards and disasters and use their management for different scenarios. | PLO-1 | C-2 |
| CLO-2 | **Value** the different phases of disaster management. | PLO-2 | C-4 |
| CLO-3 | **Debate** on sustainability after disaster occurrence. | PLO-7 | A-3 |
| CLO-4 | **Develop** emergency preparedness plan for different disasters | PLO-12 | A-4 |
| **Theory of Structures-I (CE-206) Theory** | | | |
| CLO-1 | **Discuss** basic concepts of Structural Analysis for statically determinate structures. | PLO-1 | C-2 |
| CLO-2 | **Apply** Structural Analysis concepts to measure deflections and forces in different types of structures. | PLO-2 | C-3 |
| **Theory of Structures-I (CE-206) Practical** | | | |
| CLO-1 | **Perform** experiments related to analysis of determinate structures | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| CLO-3 | **Demonstrate** the ability to develop a physical model to **present** the concepts of analysis in structures | PLO-3 | P-3, A-2 |
| **Strength of Materials-I (CE-207) Theory** | | | |
| CLO-1 | **Discuss** materials and their utilization in structures considering engineering properties | PLO-1 | C-2 |
| CLO-2 | **Apply** fundamental concepts to analyze and design structural members subjected to various loadings | PLO-2 | C-3 |
| CLO-3 | **Perform** safety analysis of structural members | PLO-2 | C-3 |
| **Strength of Materials-I (CE-207) Practical** | | | |
| CLO-1 | **Perform** experiments related to mechanical properties of materials | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| **Soil Mechanics-I (CE-208) Theory** | | | |
| CLO-1 | **Discuss** the soil formation, its index, engineering properties and behavior | PLO-1 | C-2 |
| CLO-2 | **Analyze** the effects of loads, additives and water on behavior and properties of soil | PLO-2 | C-4 |
| CLO-3 | **Prepare** a soil investigation program and perform classification of soil | PLO-4 | C-3 |

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| **Soil Mechanics-I (CE-208) Practical** | | | |
| CLO-1 | **Perform** experiments related to basic soil mechanics | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| CLO-3 | **Justify** application of experiments related to soil mechanics | PLO-10 | A-3 |
| **Drawing, Estimation & Construction (CE-209) Theory** | | | |
| CLO-1 | **Estimate** the physical quantities related to construction works | PLO-2 | C-3 |
| CLO-2 | **Discuss** architectural and legal aspects of construction projects | PLO-1 | C-2 |
| **Drawing, Estimation & Construction (CE-209) Practical** | | | |
| CLO-1 | **Accomplish** tasks related to plotting of architectural and structural drawings | PLO-9 | P-2 |
| CLO-2 | **Justify** the prepared bill of quantities | PLO-10 | A-3 |
| **Computer Applications (HU-210) Theory** | | | |
| CLO-1 | **Explain** tools and steps in AutoCAD Software for drafting engineering drawings | PLO-1 | C-2 |
| CLO-2 | **Discuss** the use of Ms Excel & MATLAB tools to solve different problems | PLO-2 | C-2 |
| CLO-3 | **Describe** different functions of latest version of both AutoCAD (in detail) and Ms Excel (in general) related to civil engineering domain. | PLO-12 | C-1 |
| **Computer Applications (HU-210) Practical** | | | |
| CLO-1 | **Demonstrate** skill of AutoCAD Software for drafting of simpler to complex engineering drawings | PLO-5 | P-3 |
| CLO-2 | **Apply** the use of Ms-Excel & MATLAB tools to solve different engineering problems | PLO-5 | C-3 |
| **Communication Skills & Technical Report Writing (CE-211) Theory** | | | |
| CLO-1 | **Recognize** and comprehend organizational communication system for improved knowledge of technical writing skills needed professionally. Understanding of do's and don'ts of technical communication. | PLO-10 | C-2 |
| CLO-2 | **Apply** of acquired understanding for communication in life-long learning. | PLO-12 | C-3 |
| CLO-3 | **Review** correct use of English language in writing and speaking in response to real circumstances | PLO-10 | C-2 |

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| **Communication Skills & Technical Report Writing (CE-211) Practical** | | | |
| CLO-1 | **Implement** effective presentation and communication skills. | PLO-10 | A-2 |
| CLO-2 | **Apply** the use of ethical values in personal and professional interactions. | PLO-8 | C-3 |
| **Theory of Structures-II (CE-301) Theory** | | | |
| CLO-1 | **Analyze** different types of indeterminate structures using force-based methods. | PLO-2 | C-3 |
| CLO-2 | **Analyze** different types of indeterminate structures using displacement-based methods. | PLO-2 | C-3 |
| **Theory of Structures-II (CE-301) Practical** | | | |
| CLO-1 | **Perform** experiments related to analysis of indeterminate structures | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| CLO-3 | **Justify** application of experiments related to indeterminate structures | PLO-10 | A-3 |
| **Strength of Materials-II (CE-302) Theory** | | | |
| CLO-1 | **Apply** concepts of stress and strain transformation in structural members. | PLO-1 | C-3 |
| CLO-2 | **Analyze** structural members under various loading conditions. | PLO-2 | C-4 |
| **Strength of Materials-II (CE-302) Practical** | | | |
| CLO-1 | **Perform** experiments related to advanced mechanics of materials | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| CLO-3 | **Justify** application of experiments related to advanced mechanics of materials | PLO-10 | A-3 |
| **Soil Mechanics-II (CE-303) Theory** | | | |
| CLO-1 | **Discuss** the engineering properties of soil, stress distribution, concepts of slope failure and dynamic loading | PLO-1 | C-2 |
| CLO-2 | **Analyze** the engineering behavior of soil and stability of slopes | PLO-2 | C-4 |
| CLO-3 | **Evaluate** design of various geotechnical structures | PLO-3 | C-5 |
| **Soil Mechanics-II (CE-303) Practical** | | | |
| CLO-1 | **Perform** experiments related to engineering properties of soil | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |

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| CLO-3 | **Justify** experiments related to engineering properties of soil | PLO-10 | A-3 |
| CLO-4 | **Applying** modern tools to predict the soil behavior under different loading conditions | PLO-5 | P-3 |
| **Construction, Planning & Management (CE-304) Theory** | | | |
| CLO-1 | **Define** basics of project management related to the civil engineering projects. | PLO-11 | C-1 |
| CLO-2 | **Apply** different techniques of project management for planning and scheduling to control and facilitate project execution. | PLO-2 | C-3 |
| CLO-3 | **Define** principles of economics related to engineering projects. | PLO-1 | C-1 |
| **Construction, Planning & Management (CE-304) Practical** | | | |
| CLO-1 | **Plan** various activities to monitor physical and financial progress of a project | PLO-11 | C-6 |
| CLO-2 | **Discuss** application of Primavera software in planning of projects | PLO-5 | C-2 |
| **Hydrology and Water Resources (CE-305) Theory** | | | |
| CLO-1 | **Discuss** basic concepts of hydrology & water resources | PLO-1 | C-2 |
| CLO-2 | **Measure** various hydrological parameters using different techniques | PLO-2 | C-4 |
| **Hydrology and Water Resources (CE-305) Practical** | | | |
| CLO-1 | **Perform** experiments related to hydrology | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| CLO-3 | **Justify** experiments related to hydrology & water resources | PLO-10 | A-3 |
| **Environmental Engineering-I (CE-306) Theory** | | | |
| CLO-1 | **Discuss** water and waste water systems | PLO-1 | C-2 |
| CLO-2 | **Apply** knowledge of environmental engineering to solve basic and complex issues | PLO-2 | C-3 |
| CLO-3 | **Discuss** environmental issues and solutions through environmental assessment reports | PLO-7 | C-2 |
| **Environmental Engineering-I (CE-306) Practical** | | | |
| CLO-1 | **Perform** experiments related to environmental engineering | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |

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| CLO-3 | **Justify** concepts related to hydrology & water resources and its impact on the society | PLO-6 | A-3 |
| **Reinforced Concrete-I (CE-307) Theory** | | | |
| CLO-1 | **Discuss** concepts of reinforced concrete structural members as per design provisions | PLO-1 | C-2 |
| CLO-2 | **Perform** analysis of reinforced concrete members for various loading conditions | PLO-2 | C-3 |
| CLO-3 | **Apply** working stress and ultimate strength methods in design of reinforced concrete members | PLO-3 | C-3 |
| **Reinforced Concrete-I (CE-307) Practical** | | | |
| CLO-1 | **Perform** experiments to conduct quality evaluation of existing structures and hardened concrete. | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| **Design of Steel Structures (CE-308) Theory** | | | |
| CLO-1 | **Explain** specifications and design philosophy of structural steel members. | PLO-1 | C-2 |
| CLO-2 | **Analyze** structural steel members under various loading conditions. | PLO-2 | C-4 |
| CLO-3 | **Apply** design procedures for structural steel members and their connections. | PLO-3 | C-3 |
| **Design of Steel Structures (CE-308) Practical** | | | |
| CLO-1 | **Accomplish** the tasks of Analyzing steel roof truss under gravity and wind load and **interpret** the analysis results. | PLO-9 | C-4, A-2 |
| CLO-2 | **Design** components of steel roof truss and **develop** shop drawing according to the latest LRFD code. | PLO-3 | C-6, P-3 |
| **Fluid Mechanics-II (CE-309) Theory** | | | |
| CLO-1 | **Explain** dimensional analysis and concepts of hydraulic machinery | PLO-1 | C-2 |
| CLO-2 | **Analyze** flow through pipes and its characteristics | PLO-2 | C-4 |
| **Fluid Mechanics-II (CE-309) Practical** | | | |
| CLO-1 | **Discuss** the components of hydraulic machinery | PLO-2 | C-2 |
| CLO-2 | **Perform** experiments related to hydraulic machinery | PLO-9 | P-2 |
| CLO-3 | **Justify** experiments related to hydraulic machinery | PLO-10 | A-3 |

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| **Transportation Engineering-I (CE-310) Theory** | | | |
| CLO-1 | **Explain** the fundamentals of transportation engineering | PLO-1 | C-2 |
| CLO-2 | **Apply** principles of transportation engineering in geometric design using various parameters | PLO-2 | C-3 |
| **Transportation Engineering-I (CE-310) Practical** | | | |
| CLO-1 | **Perform** experiments related to pavement materials | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| CLO-3 | **Argue** the use of sustainable materials in pavement construction | PLO-7 | A-3 |
| **Environmental Engineering-II (CE-401) Theory** | | | |
| CLO-1 | **Solve** basic and complex issues in the field of environmental engineering | PLO-2 | C-3 |
| CLO-2 | **Design** water supply and sanitation systems | PLO-3 | C-6 |
| **Environmental Engineering-II (CE-401) Practical** | | | |
| CLO-1 | **Perform** experiments related to environmental engineering | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| CLO-3 | **Justify** experiments related to hydrology & water resources | PLO-10 | A-3 |
| **Reinforced Concrete-II (CE-402) Theory** | | | |
| CLO-1 | **Explain** concepts of analysis and design for reinforced concrete members | PLO-1 | C-2 |
| CLO-2 | **Analyze** different reinforced concrete members | PLO-2 | C-4 |
| CLO-3 | **Apply** various design approaches for reinforced concrete members | PLO-3 | C-3 |
| **Reinforced Concrete-II (CE-402) Practical** | | | |
| CLO-1 | **Perform** experiments related to reinforced concrete members | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| CLO-3 | **Justify** experiments related to reinforced concrete members | PLO-10 | A-3 |
| **Hydraulic Engineering (CE-403) Theory** | | | |
| CLO-1 | **Discuss** hydraulic similitude and sediment transport | PLO-1 | C-2 |
| CLO-2 | **Apply** principles of hydraulic engineering to open channel flow | PLO-2 | C-3 |

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| CLO-3 | **Analyze** various hydraulic structures | PLO-2 | C-4 |
| **Hydraulic Engineering (CE-403) Practical** | | | |
| CLO-1 | **Perform** experiments related to flow and sediment transport through open channel | PLO-9 | P-2 |
| CLO-2 | **Estimate** the hydraulic parameters using experimental data | PLO-2 | C-3 |
| CLO-3 | **Justify** experiments related to Hydraulics Engineering | PLO-10 | A-3 |
| **Transportation Engineering-II (CE-404) Theory** | | | |
| CLO-1 | **Explain** fundamentals of pavement and airport engineering. | PLO-1 | C-2 |
| CLO-2 | **Apply** principles of pavement engineering to analyze and design of pavements. | PLO-2 | C-3 |
| **Transportation Engineering-II (CE-404) Practical** | | | |
| CLO-1 | **Perform** experiments related to pavement materials | PLO-9 | P-2 |
| CLO-2 | **Implement** asphalt mix design considering various parameters using standard guidelines. | PLO-3 | C-3 |
| CLO-3 | **Justify** experiments related to material properties and design | PLO-10 | A-3 |
| **Foundation Engineering (CE-405) Theory** | | | |
| CLO-1 | **Analyze** various design options for foundations according to field conditions. | PLO-3 | C-4 |
| CLO-2 | **Perform** bearing capacity and settlement analysis of foundations for different types of soils | PLO-2 | C-3 |
| CLO-3 | **Evaluate** foundations considering various geotechnical parameters | PLO-4 | C-5 |
| **Foundation Engineering (CE-405) Practical** | | | |
| CLO-1 | **Perform** experiments related to foundation design | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| CLO-3 | **Justify** experiments related to foundation design | PLO-10 | A-3 |
| **Structural Engineering (CE-407) Theory** | | | |
| CLO-1 | **Apply** matrix-based methods for analysis of various structural components | PLO-2 | C-3 |
| CLO-2 | **Design** pre-stressed concrete members, and bridge decks | PLO-3 | C-6 |
| CLO-3 | **Discuss** SDOF system for free and forced vibration with and without viscous damping | PLO-1 | C-2 |

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| **Structural Engineering (CE-407) Practical** | | | |
| CLO-1 | **Perform** experiments related to structural analysis | PLO-9 | P-2 |
| CLO-2 | **Estimate** the physical parameters using experimental data | PLO-2 | C-3 |
| **Irrigation Engineering (CE-408) Theory** | | | |
| CLO-1 | **Explain** basic concepts of irrigation engineering | PLO-1 | C-2 |
| CLO-2 | **Analyze** irrigation structures | PLO-2 | C-4 |
| CLO-3 | **Design** irrigation canals and barrages | PLO-3 | C-6 |
| **Irrigation Engineering (CE-408) Practical** | | | |
| CLO-1 | **Design** barrages and cross drainage works for simple conditions. | PLO-3 | C-6 |
| CLO-2 | **Sketch** the design of barrage and cross drainage works | PLO-9 | P-1 |
| CLO-3 | **Justify** assigned design for a specific project and its effect on the society | PLO-6 | A-3 |
| **Design of Structures (CE-409) Theory** | | | |
| CLO-1 | **Justify** selection of structural systems for various functions | PLO-2 | C-5 |
| CLO-2 | **Design** complete RC structures of various natures and importance in compliance with the standard codes of practices | PLO-3 | C-6 |
| CLO-3 | **Discuss** earthquake engineering concepts from design point of view | PLO-1 | C-2 |
| **Design of Structures (CE-409) Practical** | | | |
| CLO-1 | **Design** complete RC structures of various natures with the standard codes of practices | PLO-3 | C-6 |
| CLO-2 | **Sketch** the detail structural working drawings | PLO-9 | P-2 |
| CLO-3 | **Defend** the selection of structural system in a given scenario | PLO-10 | A-4 |
| **Computer Aided Design (CE-410) Theory** | | | |
| CLO-1 | **Discuss** finite element modeling of civil engineering structures. | PLO-1 | C-2 |
| CLO-2 | **Produce** input files for analysis and design of real 3D structures using the latest commercial softwares. | PLO-3 | C-3 |

| CLOs | CLO Statement<br>At the end of this course, students will be able to: | PLOs | Bloom's |
|---|---|---|---|
| **Computer Aided Design (CE-410) Practical** | | | |
| CLO-1 | **Demonstrate** skill of commercial softwares for analysis and design of civil engineering structures | PLO-5 | P-3 |
| CLO-2 | **Discuss** use of latest codes and softwares for analysis and design of civil engineering structures | PLO-2 | C-2 |

Total 42 subjects (excluding FYP)

Total 35 subjects with practical part (i.e., 35/42×100 = 83.33%)

Percentage coverage of Bloom's Levels:
Excluding FYP CLOs, there are total 200 CLOs against 42 subjects (Thr+Pr):

Cognitive: 66% Psychrometer: 17.5% Affective: 16.5%