THE UNIVERSITY OF LAHORE
ISLAMABAD CAMPUS

BS CIVIL ENGINEERING

Course Learning Outcomes

TABLE OF CONTENT

PLOs Mapping With CLOs

Subjects					Program Learning Outcomes												Total Weightage
					1	2	3	4	5	6	7	8	9	10	11	12	
Code	Name	Credit Hours	Theory	Lab	Engineering Knowledge	Problem Analysis	Design/Development of Solutions	Investigation	Modern Tool Usage	Engineer & Society	Environment & Sustainability	Ethics	Individual & Team work	Communication	Project Management &	Life- Long Learning	
		136	102	34	22%	22%	13%	9%	7%	5%	3%	3%	5%	5%	3%	3%	100%
FIRST SEMESTER																	
CE1103	Civil Engineering Materials & Construction	**3**	2	1	25%			30%	25%	20%							100%
CE1203	Engineering Drawing	**4**	2	2	25%								25%	50%			100%
ENG1101	English Language Skills	**3**	3	0						40%				50%		10%	100%
MA1101	Applied Calculus (Math-I)	**3**	3	0	20%	40%	20%	20%									100%
SS05105	Pakistan Studies	**1**	1	0						50%				50%			100%
SS03102	Islamic Studies	**2**	2	0								100%					100%
SECOND SEMESTER																	
CS1101	Computer Programming	**3**	1	2	25%	50%			25%								100%
CE1201	Engineering Surveying	**4**	2	2	20%	55%			25%								100%
CE1101	Engineering Mechanics	**4**	3	1	25%	50%							15%	10%			100%
CE1204	Basic Electro Mechanical Engineering	**4**	3	1	75%			25%									100%
MA1201	Differential Equation (Math-II)	**3**	3	0	20%	30%	30%	20%									100%
THIRD SEMESTER																	
CE1202	Engineering Geology	**3**	3	0	40%			60%									100%
CE2307	Advance Engineering Survey	**3**	2	1	20%	55%							25%				100%
CE2306	Mechanics of Solids-I	**4**	3	1	15%	60%		25%									100%
CE2305	Fluid Mechanics-I	**4**	3	1	35%	40%							25%				100%
MA2602	Numerical Analysis (Math-III)	**3**	3	0	40%	40%	20%										100%
FOURTH SEMESTER																	
CE2401	Quantity Surveying & Estimation	**3**	3	0	20%		50%								30%		100%
CE2302	Civil Engineering Drawing & Graphics	**3**	1	2	20%		30%		50%								100%
SS4701	Communication Skills and Technical Writing	**2**	2	0										50%		50%	100%
CE2403	Structural Analysis-I	**3**	3	0	10%	80%			10%								100%
CE2405	Soil Mechanics	**4**	3	1	40%	25%		25%				10%					100%
FIFTH SEMESTER																	
MA3501	Probability Method in Engineering(Math-IV)	**3**	3	0	30%	10%	60%										100%
CE3504	Transportation Planning and Management	**2**	2	0	45%	55%											100%
CE3505	Hydrology and Water Resources Management	**3**	2	1	25%	25%		25%	25%								100%
CE3503	Steel Structures	**3**	2	1	25%	25%	50%										100%
CE3605	Structural Analysis-II	**3**	3	0	15%	60%	25%										100%
CE3506	Construction Management & Engineering Economics	**3**	3	0	10%				10%						80%		100%
SIXTH SEMESTER																	
CE01344	Reinforced Concrete Design-I	**4**	3	1	25%		50%						25%				100%
CE01345	Mechanics of Solids-II	**3**	2	1	35%	40%		25%									100%
CE3501	Advanced Fluid Mechanics	**4**	3	1	25%	50%		25%									100%
SS15303	Social Science& Prefessional Ethics	**2**	2	0						35%				25%		40%	100%
CE04319	Environmental Engineering-I	**3**	2	1	15%	10%					50%		25%				100%
SEVENTH SEMESTER																	
CE01446	Reinforced Concrete Design-II	**4**	3	1			50%	25%	25%								100%
CE4702	Architechture and Town Planning	**3**	3	0						60%	40%						100%
CE02421	Geotechnical and Foundation Engineering	**4**	3	1	10%	25%	20%	20%				10%	15%				100%
CE4803	Environmental Engineering-II	**3**	2	1	10%					35%	30%				25%		100%
CE4705	Geo Informatics	**2**	1	1	25%	25%			50%								100%
CE05403	Civil Engineering Project(Part-A)	**3**	0	3	10%	5%	5%	5%	5%	5%	5%	10%	5%	10%	5%	30%	100%
EIGTH SEMESTER																	
CE-4811	Highway and Traffic Engineering	**3**	2	1	25%		50%						20%	5%			100%
CE4706	Structural Engineering	**3**	3	0	30%	25%		20%	25%								100%
CE-4812	Design of structure	**3**	2	1	30%	25%	25%		20%								100%
CE-4810	Hydraulics & Irrigation Engineering	**4**	3	1	30%		30%	15%	25%								100%
CE-4806	Disaster Management	**2**	2	0		50%	30%					20%					100%
CE05404	Civil Engineering Project(Part-B)	**3**	0	3	10%	5%	5%	5%	5%	5%	5%	10%	5%	10%	5%	30%	100%

SEMESTER-1

Sr#	Course Code	Course Title	Cr. Hrs
1	ENG1101	English Language Skills	3+0 = 3
2	CE1203	Engineering Drawing	2+2 = 4
3	MA1101	Applied Calculus (Math-I)	3+0 = 3
4	CE1103	Civil Engineering Materials	2+1 = 3
5	SS05105	Pak Studies	1+0 = 1
6	SS03102	Islamic Studies	2+0 = 2
Total Cr. Hrs			13+3 = 16

Mapping of Course Learning Outcome:

ENGLISH LANGUAGE SKILLS (ENG1101) CH (3+0)

Contents: Consulting Dictionary, Reading Skills, Library Resources, Parts of Speech, Sentences, Punctuation, Paragraph Writing, Composition and Comprehension, Summary Writing, Reviewing Documentaries.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Describe the fundamental skills of listening, speaking, reading and writing.	C2	50%	PLO-10
CLO:2 Prepare cohesive paragraphs, essays and précis	C3	40%	PLO-06
CLO:3 Adopt English language skills in their profession	A3	10%	PLO-12

Mapping of Course Learning Outcome:

APPLIED CALCULUS/ MATH-I (MA 1101) CH (3+0)

Contents:
Introduction to Complex Numbers, Functions, Differentiation, Partial Differentiation, Integral Calculus, Integration Applications, Analytical Solid Geometry.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Discuss properties of complex numbers and functions	C2	20%	PLO-01
CLO:2 Carry out ordinary and partial differentiation	C3	40%	PLO-02
CLO:3 Demonstrate use of analytical solid geometry	C3	20%	PLO-03
CLO:4 Apply the integration concept in engineering problems	C3	20%	PLO-04

Mapping of Course Learning Outcome:

ENGINEERING DRAWING (CE1203) CH (2+2)

Contents: Introduction to engineering drawing, Types of Civil Engineering drawings, Conceptual drawings and projections, third angle projections, isometric drawing, perspective drawings, architectural plan, elevation and section of simple buildings.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Illustrate and understand the fundamental concepts of engineering drawing.	C 3	25%	PLO-01
CLO:2 Produce drawings of simple objects and structures following drawing standards.	P 4	25%	PLO-09
CLO:3 Demonstrate skills in making engineering drawings manually by following drawing standards.	P 4	50%	PLO-10

Mapping of Course Learning Outcome:

CIVIL ENGINEERING MATERIALS (CE1103) CH=3 (2+1)

Contents: Introduction and general aspects of construction Materials in Civil Engineering, Metals and Alloys, Natural Stones, Bricks, Tiles and Ceramics, Timber and wood products, Protective Materials, Advanced construction methodologies and technologies.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Discuss the utilization and uses of various construction materials	C2	25%	PLO-01
CLO:2 Categorize various construction materials and understand their properties.	C4	30%	PLO-04
CLO:3 Analyze the impact of engineering materials on environment, society and other contemporary issue	C4	20%	PLO-06
CLO:4 Practice the techniques, Skills and modern engineering tools necessary for application of material in civil engineering practice.	P3	25%	PLO-05

Mapping of Course Learning Outcome:

PAKISTAN STUDIES (SS05105) CH (1+0)

Contents:

Definition of Ideology and explanation, Aims and objectives of establishment of Pakistan, Enforcement of sovereignty of ALLAH Almighty, Protection of Muslim culture and civilization, Legislative Council Act 1861, Hindi, Urdu Controversy, Formation of All India Muslim League (1906), Partition of Bengal, Lucknow Pact (1916), Khilafat Movement (1918-1920), Delhi Proposals (1927), Nehru report (1928), Round Table conferences (1930,1931,1932),Elections 1937 Congress Raj, Pakistan Resolution (1940),Quit India and Cripps Mission (1942), Wavell Plan 1946, Elections 1946, 3rd June Plan, Independence Act 1947,Location,Neighboring Countries and Borders, geo graphical significance, Natural Resources, Economics Aspects, Determination of Pakistan's foreign Policy, Phases of Pakistan Foreign Policy, (NAM, UNO),Phases of Pakistan Foreign Policy, (COMMON WEALTH) ,China and Pakistan relations and Indo Pakistan Relations.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Describe the importance of Geographic Location, Foreign Policy as a relation of Pakistan in global prospective.	C2	50%	PLO-06
CLO:2 Discuss the ideology and the struggle behind the creation of Pakistan	C2	50%	PLO-10

Mapping of Course Learning Outcome:

ISLAMIC STUDIES (SS03102) CH (2+0)

Contents: Tuheed: Verse Surah Al Baqarah (164) (Translation and Explanation) Define kinds of Tuheed, logics, Signs of Allah. Amar bil Maroof wa Nahee un Munkar Verse: Surah Imran (110) (Translation and Explanation), Surah Al Nahl (125) (Translation and Explanation), Definition Importance and main explanation of Khairul Ummah and Ummat-e-wast. Human Rights (Haqooq Ul Ebad), Verse: Surah Al Maidah (32) (Translation and Explanation), Kinds Basic Human Rights, Self-Respect Relation with Non-Believers Verse: Al Mumtahinah (8,9) (Translation and Explanation). Ahadithn 6 (Translation and Explanation, Introduction of Hadith, definition, kinds).

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Explain basic information about faith, worship and islamic civilization.	C2	40%	PLO-08
CLO:2 Practice basic pillars, core values through essential requirements of Quran and Sunnah in Islam	A3	60%	PLO-08

SEMESTER-2

Sr#	Course Code	Course Title	Cr. Hrs
1	CS1101	Computer Programming	1+2 = 3
2	CE1101	Engineering Mechanics	3+1 = 4
3	CE1201	Engineering Surveying	2+2 = 4
4	CE1204	Basic Electro Mechanical Engineering	3+1 = 4
5	MA1201	Differential Equation (Math-II)	3+0 = 3
Total Cr. Hrs			12+6 = 18

Mapping of Course Learning Outcome:

COMPUTER PROGRAMMING (CS1101) CH (1+2)

Contents: To acquaint the students with the structure, operation, programming, and applications of computers. To develop the skills of analyzing the computer programming problems and their solutions.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Identify various computer peripherals, storage media and types of software.	C1	25%	PLO-01
CLO:2 Apply C++ programming language to write, debug and execute programs.	C3	50%	PLO-02
CLO:3 Practice the effective use of computer technology and programming in C++.	P3	25%	PLO-05

Mapping of Course Learning Outcome:

ENGINEERING MECHANICS (CE1101) CH (3+1)

Contents: Basic Concepts, System of Forces, Equilibrium of Rigid Bodies, Kinematics, Rigid Bodies, Friction

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Describe the basic laws and principles of mechanics	C2	25%	PLO-01
CLO:2 Apply knowledge of equilibrium and produce shear force and bending moment diagrams manually.	C3	50%	PLO-02
CLO:3 Demonstrate fundamental concepts of engineering mechanics using relevant apparatus.	P4	15%	PLO-09
CLO:4 Communicate and answer freely concepts of Engineering mechanics in conducted experiments	A2	10%	PLO-10

Mapping of Course Learning Outcome:

ENGINEERING SURVEYING (CE1201) CH (2+2)

Contents: Introduction to Engineering Surveying; Survey Techniques, Modern Methods in Surveying, Leveling, Profile & Cross-sections, Computations and Plotting.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Explain various principles and techniques of basic surveying	C2	20%	PLO-01
CLO:2 Apply various techniques to prepare maps and plans, profiles, cross-sections, etc. using surveying techniques.	C3	55%	PLO-02
CLO:3 Operate various survey equipment for measurements with required accuracy.	P3	25%	PLO-05

Mapping of Course Learning Outcome:

BASIC ELECTRO-MECHANICAL ENGINEERING (CE1204) CH (3+1)

Content: Introduction to Electrical Elements and Circuits, Power Plant Installations and Distribution System, Mechanical Engineering Component, Basic Concepts, Heating Ventilation and Air Conditioning (HVAC).

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Apply circuit reduction techniques such as series, parallel and source.	C3	40%	PLO-01
CLO:2 Illustrate circuit solving techniques like Mesh and Node Analysis to analyze for steady state solutions for both sinusoidal AC and DC.	C3	35%	PLO-01
CLO:3 Conduct experiments to observe conformance of experimental data with analyzed results of circuits.	P4	25%	PLO-04

Mapping of Course Learning Outcome:

DIFFERENTIAL EQUATIONS / MATHS-II (MA1201) CH (3+0)

Contents: Introduction to Matrices, 1st Order Differential Equations, 2nd and Higher Orders Equations, Partial Differential Equations, Fourier series.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Use basic techniques pertaining to matrices	C3	20%	PLO-01
CLO:2 Solve differential equations of various types	C3	30%	PLO-02
CLO:3 Apply solution of partial differential equations in engineering	C3	30%	PLO-03
CLO:4 Outline the procedure to use Fourier Series for engineering applications	C4	20%	PLO-04

SEMESTER-3

Sr#	Course Code	Course Title	Cr. Hrs
1	CE1202	Engineering Geology	3+0 = 3
2	MA2602	Numerical Analysis (Math-III)	3+0 = 3
3	CE2307	Advanced Engineering Surveying	2+1 = 3
4	CE2306	Mechanics of Solids-I	3+1 = 4
5	CE2305	Fluid Mechanics- I	3+1 = 4
Total Cr. Hrs			14+3 = 17

Mapping of Course Learning Outcome:

ENGINEERING GEOLOGY (CE1202) CH (3+0)

Contents: Rocks formation and classification, Physical properties and identification of common rock forming minerals, Geological classification and identification of Rocks by geological names, weathering and Erosion, Discontinuity classification (faults, folds, joints), Brief Introduction to structural Geology, Role of geology in selection of sites for dams, reservoirs, tunnels, ports/harbors and other civil engineering structures, Land Slides, Glaciers and Glaciations, Volcanoes, Formation of Volcanoes, Types of Volcanoes, Nature and Types of Eruption.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Discuss the fundamental aspects of earth geology, seismology and geomorphology.	C2	40%	PLO-01
CLO:2 Categorize geo-materials based on origin, composition and physic-mechanical characteristics.	C4	30%	PLO-04
CLO:3 Describe appropriate geological and physical method for subsurface exploratory surveying	C2	30%	PLO-04

Mapping of Course Learning Outcome:

NUMERICAL ANALYSIS / MATH III (MA2602) CH (3+0)

Contents: Introduction to solution of Non-Linear Equations, Finite Differences, Numerical Integration, Solution of Linear Simultaneous Equations, Complex Variables.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Solve ordinary and partial differential equation numerically.	C3	40%	PLO-01
CLO:2 Apply numerical integration for various engineering problems.	C3	40%	PLO-02
CLO:3 Illustrate complex variables in engineering problems.	C3	20%	PLO-03

Mapping of Course Learning Outcome:

ADVANCED ENGINEERING SURVEYING (CE2307) CH (2+1)

Contents: Modern methods in surveying, Hydrographic surveys, control surveys, surveying application, methods and application of contouring, practical solutions and use of contouring software, preparation and interpretation of topographic maps.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Solve various types of curves.	C3	20%	PLO-01
CLO:2 Prepare and interpret topographic maps, construction surveys, hydrographic surveys and photogrammetry.	C3	55%	PLO-02
CLO:3 Demonstrate use of theodolite, total station and other equipment for surveying.	P4	25%	PLO-09

Mapping of Course Learning Outcome

MECHANICS OF SOLIDS - I (CE2306) CH (3+1)

Contents: Introduction to Simple Stress and Strain, Stresses in Beams, SFD and BMD of Statically Determinate Beams, Columns and Struts, Circular Shafts.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Discuss the behavior of Structural members subjected to different sets of loading and states of stresses.	C2	15%	PLO-01
CLO:2 Solve problems related to different set of loadings.	C3	60%	PLO-02
CLO:3 Practice experiments to study the material response under different sets of loadings.	A3	25%	PLO-04

Mapping of Course Learning Outcome

FLUID MECHANICS (CE2305) CH (3+1)

Contents: Introduction, Fluid Statics, Forces on Immersed Bodies, Fluid Kinematics, Hydrodynamics, Flow Measurement, Steady Flow through Pipes, and Uniform Flow in Open Cannels.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Describe various basic terms related to fluid mechanics.	C2	35%	PLO-01
CLO:2 Analyze various parameters related to fluid mechanics.	C4	40%	PLO-02
CLO:3 Practice various experiments on basic fluid mechanics equipment.	P3	25%	PLO-9

SEMESTER-4

Sr#	Course Code	Course Title	Cr. Hrs
1	CE2401	Quantity Surveying & Estimation	3+0 = 3
2	CE2403	Structural Analysis-I	3+0 = 3
3	CE2405	Soil Mechanics	3+1 = 4
4	SS4701	Communication Skills and Technical Writing	2+0 = 0
5	CE2302	Civil Engineering Drawing & Graphics	1+2 = 3
Total Cr. Hrs			12+3=15

Mapping of Course Learning Outcome

QUANTITY SURVEYING & ESTIMATION (CE2401) CH (3+0)

Contents:

Scope: Scope of civil engineering works; general practice in government departments for schedule of rates and specifications; Rate analysis; Specifications for various items of construction.

Bill of Quantities (B.O.Q) & Measurement Book (M.B): Types and methods of estimates, working out quantities, rates and cost analysis of construction materials; Valuation, depreciation and sinking fund. Contents and preparation of bills of quantities for different projects like irrigation, roads, sanitary, building etc. and maintaining of Measurement Books. Measurement, specification and costing of excavation and back filling, mass concrete retaining walls, beams, concrete piles, steel or wooden truss or steel framed gantry, estate road, sewer and water main pipe works, Priced bill of quantity.

Tendering: Preparation of civil engineering contracts and tender documents. Introduction to claims and conflicts resolution e.g. escalation, indexation, arbitration and litigation. Evaluation of proposals and contracts.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Explain administrative hierarchy, project approval procedures, arbitration and litigation processes related to construction projects.	C2	20%	PLO-01
CLO:2 Produce bill of quantities and perform rate analysis.	P4	50%	PLO-03
CLO:3 Prepare contract documents for various construction projects using PEC guidelines.	C3	30%	PLO-11

Mapping of Course Learning Outcome

STRUCTURAL ANALYSIS-I (CE2403) CH (3+0)

Contents: Introduction to Structure Analysis, Analysis of Trusses by Method of joints, Analysis of Trusses by Method of section, Axial force, SFD & BMD for Statically Determinate Frames, Axial force SFD & BMD for Statically Determinate Beams, Deflection of beams by moment area method, Deflection of Beams by Conjugate beam method, Deflection of Beams by Double integration method, Cables and Suspension Bridges, Influence Line Diagrams, Principle of virtual work, unit load method, graphical method, Three Hinged Arches.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Discuss basic concepts of structural analysis for statically determinate structures.	C2	10%	PLO-01
CLO:2 Apply methods of analysis on determinate structures	C3	30%	PLO-02
CLO:3 Analyze different types of structures for deflections, rotations and forces	C4	50%	PLO-02
CLO:4 Solve the problems using computer aided tools. (RISA, MD SOLIDS)	C3	10%	PLO-05

Mapping of Course Learning Outcome

SOIL MECHANICS (CE2405) CH (3+1)

Contents: Soil formation and its Constituents, index properties, Soil classification, Soil Compaction, Permeability and Seepage, Geotechnical Investigation, Stress distribution, Shear Strength.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Carry out classification of soil & discuss compaction fundamentals	C3	40%	PLO-01
CLO:2 Analyze soil mass for stress, seepage and settlement	C4	25%	PLO-02
CLO:3 Investigate the shear strength parameters of different types of soil.	C4	10%	PLO-04
CLO:4 Practice field and laboratory testing to characterize subsoils	P3	15%	PLO-04
CLO:5 Assume responsibility in assignments and presentations.	A3	10%	PLO-08

Mapping of Course Learning Outcome

COMMUNICATION SKILLS AND TECHNICAL WRITING (SS4701) CH (2+0)

Contents: Paragraph Writing, Essay Writing, CV and Job Application, Translation Skills, Study Skills, Academic Skills, Presentation Skills.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Understand the fundamental skills Listening, Speaking, Reading and Writing	C3	50%	PLO-10
CLO:2 Adopt English language skills in technical communication.	A3	50%	PLO-12

Mapping of Course Learning Outcome

CIVIL ENGINEERING DRAWING & GRAPHICS (CE2302) CH (1+2)

Contents: Concepts of engineering drawing, modern tool usage, Computer aided drawing using Auto Cad, Architectural drawing, Structural Drawing, Building Drawing, Structural details of steel roof truss, drainage structures, drawing of roads and highways.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Explain the fundamentals of architectural drawing and learn different functions of latest AutoCAD version	C2	20%	PLO-01
CLO:2 Demonstrate concepts of broader aspects of civil engineering drawing and have skills to prepare architectural and structural drawings.	C3	30%	PLO-03
CLO:3 Produce civil engineering drawings using AutoCAD software	P4	50%	PLO-05

SEMESTER-5

Sr#	Course Code	Course Title	Cr. Hrs
1	MA3501	Probability Methods in Engineering /Math IV	3+0 = 3
2	CE3504	Transportation Planning & Management	2+0= 2
3	CE3505	Hydrology and Water Management	2+1 = 3
4	CE3605	Structural Analysis-II	3+0 = 3
5	CE3503	Steel Structures	2+1 = 3
6	CE3506	Construction Management& Engineering Economics	3+0 = 3
Total Cr. Hrs			15+2 = 17

Mapping of Course Learning Outcome

PROBABILITY METHODS IN ENGINEERING/MATHS-IV (MA3501) (3+0)

Contents: Presentation of data, measure of central tendency, measure of dispersion, curve fitting, simple regression, probability, random variable and probability distributions.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Explain the basic terms of statistics & dispersion of data.	C2	30%	PLO-01
CLO:2 Apply linear regression for statistical data analysis and curve fitting.	C3	10%	PLO-02
CLO:3 Discuss random variables, concept of probability and various probability distribution.	C2	60%	PLO-03

Mapping of Course Learning Outcome

TRANSPORTATION PLANNING AND ENGINEERING (CE3504) CH (2+0)

Contents: Introduction to Transportation Systems, Highway Engineering, Railway Engineering, Airport Engineering, Coastal Engineering

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Discuss basic characteristics of various modes of transportation system.	C2	45%	PLO-1
CLO:2 Demonstrate design aspects of various components of highways, airports, railways, harbor & docks.	C3	55%	PLO-2

Mapping of Course Learning Outcome

HYDROLOGY & WATER RESOURCES MANAGEMENT (CE3505) CH (2+1)

Contents: Introduction to Hydrology, hydrologic cycle, hydrologic equation, practical uses of hydrology, importance of hydrology, Meteorology, Precipitation, Evaporation and Transpiration, Stream Flow, Runoff & Hydrographs, Stream Flow Routing, Groundwater, Water Management

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Demonstrate the measurements of various meteorological parameters.	C3	25 %	PLO-1
CLO:2 Use hydrologic equations to calculate various hydrological parameters.	C3	25%	PLO-4
CLO:3 Describe various methods of flood estimation, stream flow and flood routing.	C2	25%	PLO-2
CLO:4 Execute surface and sub-surface flow parameters**.**	P4	25%	PLO-5

Mapping of Course Learning Outcome

STRUCTURAL ANALYSIS-II (CE3605) CH (3+0)

Contents: Introduction to Indeterminate Structures, Force Method, Displacement Method, Column Analogy Method, Moment Distribution Method, Analysis of indeterminate trusses, Analysis of two-hinged arches and Influence Line Diagram (ILD) for Indeterminate Members.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Identify indeterminate structures considering the stability and determinacy parameters.	C1	15%	PLO-01
CLO:2 Apply methods of analysis on indeterminate structures.	C3	60%	PLO-02
CLO:3 Analyze complex structures (non-prismatic, portable and sideways frames)	C4	25%	PLO-03

Mapping of Course Learning Outcome

STEEL STRUCTURES (CE3503) CH (2+1)

Contents: Introduction to use of steel as a structural material. Load calculations. Fundamentals of Design Methods; Working Stress Method and Load and Resistance Factor Design. Design and analysis of tension members, Design and analysis of compression members, Design and analysis of Beams, Design and analysis of bolt and weld connections.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Explain and Apply fundamental concepts of Steel Structure design.	C2	25%	PLO-01
CLO:2 Analyze a structure or structural components i.e. tension, compression, flexure members along with their connections (bolt & weld) under the action of gravity.	C4	25%	PLO-02
CLO: 3 Design a structure or structural components i.e. tension, compression, flexure members along with their connections (bolt & weld).	C5	50%	PLO-03

Mapping of Course Learning Outcome

CONSTRUCTION MANAGEMENT AND ENGINEERING ECONOMICS (CE3506) CH (3+0)

Contents: Introduction to Project management, Project Planning, Scheduling and Controlling by Deterministic Models, Project Planning, Scheduling and Controlling by Probabilistic Models, Engineering Economy, Depreciation and Taxes, Selection between Alternatives

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 **Describe** the fundamentals of construction management and engineering economy.	C2	10%	PLO-01
CLO:2 **Apply** various techniques for the determination of critical path duration.	C3	40%	PLO-11
CLO:3 **Understand** application of basic economic principles, money-time relationships and practice economic decision analysis.	C3	40%	PLO-11
CLO:4 **Produce** project schedule using scheduling software (i.e. primavera P6).	P4	10%	PLO-5

SEMESTER-6

Sr#	Course Code	Course Title	Cr. Hrs
1	CE01344	Reinforced Concrete Design-I	3+1 = 4
2	CE01345	Mechanics of Solids-II	2+1 = 3
3	CE3501	Advanced Fluid Mechanics	3+1 = 4
4	CE04319	Environmental Engineering-I	2+1 = 3
5	SS15303	Social Sciences & Professional Ethics	2+0 = 2
Total Cr. Hrs			12+4=16

Mapping of Course Learning Outcome

REINFORCED CONCRETE DESIGN-I (CE01344) CH (3+1)

Contents: Properties of freshly mixed and hardened concrete, factors affecting on concrete, durability of concrete, Reaction in concrete. Concrete mixes and quality control, creep and shrinkage of concrete, Admixtures for concrete. Epoxy compounds, curing methods, corrosion of reinforcement. Hot and cold weather concreting, Basic principles of reinforced concrete design, Flexure & shear design of RC beams, T-beams, Structural Design of RC Slab, Concrete bond and development length, splicing of bars, ACI provisions. Detailing of beam-column joints, Design of simple axial loaded columns

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO: 1 Illustrate various properties of concrete.	C3	25%	PLO-01
CLO: 2 Design various structural reinforced concrete elements.	C5	50%	PLO-03
CLO: 3 Practice experiments on concrete for suitable use.	P3	25%	PLO-09

Mapping of Course Learning Outcome

MECHANICS OF SOLIDS-II (CE01345) CH (2+1)

Contents: Stress Analysis, Introduction to Theory of Elasticity, Theories of Yielding/Failure (Plastic Limit Analysis), Cylinders, Columns, Flat Plates, Curved Beams, Torsion of Thin Walled Tubes and Non-Circular Members.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Describe theory of elasticity, stresses, theories of yielding/failure and Moher circle.	C2	35%	PLO-01
CLO:2 Apply theories of Failure & Determine the buckling loads in long and short columns with various end-conditions	C3	40%	PLO-02
CLO:3 Determine stresses and buckling loads under different conditions.	P4	25%	PLO-04

Mapping of Course Learning Outcome

ADVANCED FLUID MECHANICS (CE3501) CH (3+1)

Contents: Hydrodynamic review, Steady flow through pipes, flow around immersed bodies, impact of jets, Impulse turbines, Reaction turbines, centrifugal pumps, Reciprocating pumps.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Identify flow types, flow lines & different methods of drawing flow net diagrams. Discuss different dynamic parameters and losses	C1	25 %	PLO-01
CLO:2 Explain types, construction features, functions, working principle & efficiency of different water turbines	C2	50 %	PLO-02
CLO:3 Imitate various experiments on advanced equipment related to fluid mechanics.	P3	25 %	PLO-4

Mapping of Course Learning Outcome:

ENVIRONMENTAL ENGINEERING-I (CE04319) CH (2+1)

Contents: Water Pollution, Water Demand and Supply, Water Quality, Water Sampling and Testing, Water Treatment, Miscellaneous Water Treatment Techniques, Water Distribution.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Explain the basics about environment, water and Sanitary Engineering	C2	15%	PLO-1
CLO:2 Design for the water management, water demand, Supply and distribution.	C5	10%	PLO-2
CLO: 3 Analyze the causes and effects of pollutions on air, water and environment.	C4	50%	PLO-7
CLO:4 Conduct experiments related to various parameters for water quality.	P4	25%	PLO-9

Mapping of Course Learning Outcome:

SOCIAL SCIENCE & Professional Ethics (SS15303) CH (2+0)

Contents: Introduction to Organization Behavior (OB), Personality, Attitude, Behavior, Emotions and Moods, Perception and Decision Making, Motivation, Leadership, Conflict and Negotiation, Power and Politics, Organizational Change and Culture.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Explain basic concepts that determine the behaviors of individuals in organizational settings.	C2	35%	PLO-6
CLO:2 Adopt the knowledge of professional ethics and organizational behavior.	A3	40%	PLO-12
CLO:3 Demonstrate communication and interpersonal skills.	P4	25%	PLO-10

SEMESTER-7

Sr#	Course Code	Course Title	Cr. Hrs
1	CE4702	Architecture & Town Planning	3+0 = 3
2	CE4803	Environmental Engineering II	2+1 = 3
3	CE01446	Reinforced Concrete Design-II	3+1 = 4
4	CE02421	Geotechnical and Foundation Engineering	3+1 = 4
5	CE4705	Geo Informatics	1+1 = 2
6	CE05403	Civil Engineering Project (Part A)	0+3 = 3
Total Cr. Hrs			12+7 = 19

Mapping of Course Learning Outcome:

ARCHITECTURE & TOWN PLANNING (CE4702) CH (3+0)

Contents: Town planning introduction, Preliminary studies in town planning, land use patterns and street patterns, city extensions and sub urban development, architecture introduction, qualities, factors and used of materials, architectural aspects of building planning, landscaping in architecture, urban design and urban planning.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 **Explain** the processes of change in social, economic, cultural dimensions of the town, its impact on society and propose improvements.	C2	60%	PLO-06
CLO:2 **Demonstrate** the current and future urban development patterns and relationship between people and the built environment.	C3	40%	PLO-07

Mapping of Course Learning Outcome:

ENVIRONMENTAL ENGINEERING-II (CE4803) CH (2+1)

Contents: Estimation of Sewage Quantities, Characteristics of Sewage, Sewer system, Sewage, Treatment and Disposal, Sewage Disposal, Building drainage, Solid waste management:

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Describe the fundamental components of water and wastewater treatment systems and solid waste management.	C2	10%	PLO-01
CLO:2 Develop formal Environmental Impact Assessment reports for a real-life situation	C5	30%	PLO-07
CLO:3 O**utline** knowledge about environmental impact of climate change and society.	C5	35%	PLO-06
CLO:4 Conduct experiments related to various parameters to ascertain wastewater quality and prepare formal reports.	P4	25%	PLO-05

Mapping of Course Learning Outcome:

REINFORCED CONCRETE DESIGN -II (CE01446) CH (3+1)

Contents: Slabs, Columns, footings, Pre-stressed Concrete.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Analyze and design of various structural components using design codes.	C4	50%	PLO-03
CLO:2 Analyze structures using modern tools such as ETABS, SAFE and SAP.	C4	25%	PLO-05
CLO:3 Practice design of concrete mixes, casting and testing of concrete specimens.	P3	25%	PLO-04

Mapping of Course Learning Outcome:

GEOTECHNICAL AND FOUNDATION ENGINEERING (CE02421) CH (3+1)

Contents: Bearing Capacity, Earth Pressure, Stability of Slopes, Earth and Rock Fill Dams, Soil Dynamics, Soil Improvement, Geotechnical Investigation Report, Introduction to Deep Foundation.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Analyze earth pressures, bearing capacity and stability of slope	C4	25%	PLO-02
CLO:2 Develop geotechnical design of shallow and deep foundations.	C5	20%	PLO-03
CLO:3 Carry out investigation of sub soils and prepare geotechnical report.	C3	20%	PLO-04
CLO:4 Describe Dam components and general design considerations	C2	10%	PLO-01
CLO: 5 Practice field and laboratory testing to characterize subsoils	P3	15%	PLO-09
CLO:6 Assume responsibility in assignments and presentations.	A3	10%	PLO-08

Mapping of Course Learning Outcome:

GEO INFORMATICS (CE4705) CH (1+1)

Contents: Introduction to Geo Informatics, GIS Information Resources, Map projection and Coordinate System, Global Positioning Systems GPS, Remote Sensing, Components of GIS and Differential GPS.

Mapping:

Description	Taxonomy Level	Allocated Percentage 100%	Mapped PLO
CLO:1 Understand the Geographic information about positioning and locations that may be used for infrastructure development.	C3	25%	PLO-1
CLO:2 Analyze data from existing GIS resources such as aerial photographs, maps and satellite information.	C4	25%	PLO-2
CLO:3 Prepare terrain models for study and evaluation as an integral part of a project design.	C3	25%	PLO-5
CLO:4 Practice application of GIS software for spatial data analysis.	P3	25%	PLO-5

SEMESTER-8

Sr#	Course Code	Course Title	Cr. Hrs
1	CE4706	Structural Engineering	3+0 = 3
2	CE4810	Hydraulics & Irrigation Engineering	3+1 = 4
3	CE4812	Design of Structures	2+1 = 3
4	CE4811	Highway and Traffic Engineering	2+1 = 3
5	CE4806	Disaster Management	2+0 = 2
6	CE05404	Civil Engineering Project (Part-B)	0+3 = 3
Total Cr. Hrs			12+6 = 18

Mapping of Course Learning Outcome:

STRUCTURAL ENGINEERING (CE4706) CH (3+0)

Contents: Plastic Theory, analysis of continuous beams and portal frames, Introduction to Bridge Engineering, Matrix methods of analysis, Introduction to Finite Element Methods, Introduction to Structural Dynamics and Earthquake Engineering.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Explain basics of structural dynamics, earthquake engineering and analysis of Structures.	C2	30%	PLO-01
CLO:2 Discuss seismic zoning of Pakistan with code provisions.	C2	25%	PLO-02
CLO:3 Analyze structure with evaluation of performance based on code.	C4	20%	PLO-04
CLO:4 Conduct computer aided analysis of structural components using modern tools.	P4	25%	PLO-05

Mapping of Course Learning Outcome:

DESIGN OF STRUCTURES (CE4812) CH (2+1)

Contents: Fundamentals of Structural Engineering, Load calculation based on code provisions and their distribution to various structural members in design Load Path, design of Columns with combined Axial Load and Bending Moments, design and detailing of conventional slab system with beams and Flat Slab system using Direct Design Method(DDM), Introduction to Lateral Loads on Buildings (Earthquake and Wind loadings) and Seismic Design of structures, Introduction to Finite Element software ETABS and SAFE for building analysis & design.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Explain and apply fundamental concepts of Reinforced Concrete Design to solve Engineering problems.	C2	30%	PLO-01
CLO:2 Analyze a Structure or Structural Components under the action of Gravity and Seismic Loads.	C4	25%	PLO-02
CLO:3 Design a real life reinforced concrete structure by hand calculations	C5	25%	PLO-03
CLO:4 Demonstrate skill in building design using modern tools.	P4	20%	PLO-05

Mapping of Course Learning Outcome:

HIGHWAY AND TRAFFIC ENGINEERING (CE4811) CH (2+1)

Contents: Introduction to Road Systems, Pavement Materials, Geometric Design, Design of Flexible and Rigid Pavement, Traffic Engineering.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Explain the fundamentals of highway, pavement and traffic engineering.	C2	10%	PLO-1
CLO:2 Design of flexible and rigid pavements, Geometric Design, Pavement failures and remedies.	C5	50%	PLO-3
CLO: 3 Discuss traffic surveys, traffic safety, traffic control devices, capacity analysis, Design parameters and management techniques, Introduction to relevant software.	C2	15%	PLO-1
CLO:4 Practice experiments to find out the behavior and properties of pavement materials under different situations.	P3	20%	PLO-9
CLO:5 Express the properties and usage of pavement materials based upon experimental results.	A3	5%	PLO-10

Mapping of Course Learning Outcome:

DISASTER MANAGEMENT (CE4806) CH (2+0)

Contents: Introduction to Disaster Management, Disaster Types and Country Risk Profile, Disaster Mitigation, Disaster Preparedness, Disaster Response and Recovery, Role of Technology in Disaster Management, Community Based Disaster Management, Disaster Impacts, Social Vulnerability Analysis, National Disaster Management Plan

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Discuss the basic terms of disaster management, disaster phases, feasibility and engineering design, planning and management principles.	C2	50%	PLO-02
CLO:2 Outline disaster management plans/documentation and manage it (execution, monitoring and auditing).	C4	30%	PLO-03
CLO:3 Express aptitude, innovation, creativity in the subject as to exhibit responsibility in the practical work (assignments. presentations, case-studies and Viva).	A3	20%	PLO-08

Mapping of Course Learning Outcome:

HYDRAULICS & IRRIGATION ENGINEERING (CE-4810) CH (3+1)

Contents: Steady Flow in Open Channels, Unsteady Flow, Dimensional Analysis and Similitude Dams and Hydro Power Engineering, Canal Irrigation, Hydraulic Structures, Water logging and salinity, Drainage.

Mapping:

Description	Taxonomy Level	Allocated Percentage	Mapped PLO
CLO:1 Demonstrate the basics of steady flow in open channel, canal irrigation, water resource & irrigation practices.	C3	30%	PLO-01
CLO:2 Analyze the design of common hydraulic structures and irrigation systems and understand their mechanism.	C4	30%	PLO-03
CLO:3 Illustrate the role of effective irrigation, drainage, Hydropower development & water resource management.	C3	15%	PLO-04
CLO:4 Imitate and perform the experimentation to verify the theoretical principles of hydraulics & irrigation engineering	P4	25%	PLO-05