



Mehran University of Engineering and Technology, Jamshoro
Department of Civil Engineering

Title of Subject	:	<u>Structural Analysis (Th)</u>	
Code	:	CE306	
Discipline	:	Civil Engineering (5 th Semester)	
Effective	:	18-Batch and onwards	
Pre-requisite	:	Theory of Structures	Co-requisite: Nil
Assessment	:	Theory: 20% Sessional, 80% Written Semester Examination (20% Mid, 60% Final)	
Credit Hours	:	03 + 00	Marks : 100 + 00
Minimum Contact Hours:		45 + 00	

Course Learning Outcomes (CLOs):

Upon successful completion of the course, the student will be able to:

CLO	Description	Taxonomy Level	PLO
1	SOLVE beams, frames and trusses for deflections and slopes in determinate and indeterminate structures	C3	3
2	ANALYZE the structures by modern analytical methods.	C4	2

Course outline:

• **Introduction**

Determinate and indeterminate structures, Degree of indeterminacy in beams, frames and trusses.

• **Determinate Structures:**

Beams: Double integration, Moment area, Conjugate beam, Unit load method and theory of Castigliano, Frames: Unit load, Moment area method and movement of joints, Trusses: Unit load, Joint displacement, Graphical and angle weight method.

• **Indeterminate Structures:**

Consistent deformation method: Statically indeterminate beams /frames of one and two redundant, Laws of reciprocal deflections, Theorem of least work, Three Moment Theorem Derivation of the theorem and application to statically indeterminate beams, Method of Slope Deflection Derivation of equation, Analysis of continuous beams and portal frames without joint movement/with joint movement, Analysis of continuous beams and portal frames due to yielding of supports, Moment Distribution Method Concept, distribution and carryover factors, Analysis of continuous beams and portal frames without joint movement/with joint movement, Analysis of continuous beams and portal frames due to yielding of supports, Introduction to matrix stiffness method Stiffness Methods Formation of element stiffness matrix for truss, beam and frame element, Deformation transformation matrix, Structures stiffness matrix for truss, beam and frame elements, Analysis of indeterminate structure using stiffness method.

Recommended Books:

- Statically Indeterminate Structure, Chu-Kia-Wang, Me Graw Hill International, Latest Edition
- Structural Analysis, Russel C Hibbler, Prentice Hall International, Latest Edition



Mehran University of Engineering and Technology, Jamshoro
Department of Civil Engineering

- Matrix method of structural analysis, B. Fraeijs de Venbehe Pergmon Press Oxford, Latest Edition
- Intermediate structure analysis, Chu Kia Wang, Mc Graw Hill International, Latest Edition

Approval:

Board of Studies:	Resolution No. 32.3	Dated: 03-10-2020
Board of Faculty:	Resolution No. 20.11	Dated: 07-10-2020
Academic Council:	Resolution No. 98.7(ii)	Dated: 22-10-2020



Mehran University of Engineering and Technology, Jamshoro
Department of Civil Engineering

Title of Subject	:	Plain and Reinforced Concrete (Th + Pr)
Code	:	CE345
Discipline	:	Civil Engineering (5 th Semester)
Effective	:	18-Batch and onwards
Pre-requisite	:	Civil Engineering Materials Co-requisite: Nil
Assessment	:	Theory: 20% Sessional, 80% Written Semester Examination (20% Mid, 60% Final) Practical: 40% Sessional, 60% Final Examination
Credit Hours	:	03 + 01 Marks : 100 + 50
Minimum Contact Hours:	:	45 + 45

Course Learning Outcomes (CLOs):

Upon successful completion of the course, the student will be able to:

CLO	Description	Taxonomy Level	PLO
1	DESCRIBE various properties of concrete and its ingredients.	C2	1
2	DESIGN various structural elements of reinforced concrete.	C6	3
3	PRACTICE laboratory tests on concrete and its ingredients.	P3	4

Course outline:

● **Plain concrete:**

Cement: manufacture of Portland cement, physical and chemical properties of cement, Aggregate: properties of aggregates, Admixtures, various types of aggregates, Design of concrete mixes, Production of concrete, batching, mixing, transportation, placing, compaction and curing of concrete, Properties of concrete in fresh state, Properties of concrete in hardened state, Durability of concrete structures, cracks and repair of concrete structures.

● **Reinforced concrete:**

Basic principles of Reinforced concrete design, Design methods of reinforced concrete members, Basic concepts of working stress and ultimate strength design methods, Balanced, under reinforced and over reinforced section, Analysis and design of prismatic and non-prismatic sections in flexure, Slab and its types, Analysis and design of one-way solid slabs.

Practical Work to be carried out:

1. Introduction to Laboratory and HSE Measures.
2. To determine the soundness of a given sample of cement by Le-Chatelier's Apparatus.
3. To determine the zoning of a given sample of fine aggregate.
4. To determine the maximum size of a given sample of coarse aggregate.
5. To determine the quantity of silt and clay in a given sample of fine aggregate.
6. To determine the compressive strength of mortar cubes.
7. To prepare the concrete mix and determine the workability of fresh concrete by slump test method.
8. To determine the workability of fresh concrete by compaction factor test method.



Mehran University of Engineering and Technology, Jamshoro
Department of Civil Engineering

9. To determine the workability of fresh concrete by Ve-Bee Consistometer test method.
10. To determine the workability of fresh concrete by flow table test method.
11. To determine the unit weight of fresh concrete.
12. To determine the unit weight of hardened concrete.
13. To determine the water absorption of hardened concrete.
14. To cast cubes and cylinders and determine the compressive strength of concrete cubes and cylinders.
15. To perform an open-ended lab.

Recommended Books:

- Concrete Technology, A. M. Neville and J.J. Brooks, Publisher: Longman, Latest Edition
- Advanced Concrete Technology: Constituent Material, J. Newman and B.S. Choo, Publisher: Butterworth Heinemann, Latest Edition
- Design of Concrete Structures, A.H. Nilson, D. Darwin and C.W. Dolan, Publisher: McGraw Hill Company, Latest Edition
- Structural Concrete: Theory and Design, M.N. Hassoun and A.A. Manaseer, Publisher: John Wiley & Sons. Inc., Latest Edition

Approval:

Board of Studies:

Resolution No. 32.3

Dated: 03-10-2020

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Academic Council:

Resolution No. 98.7(ii)

Dated: 22-10-2020



Mehran University of Engineering and Technology, Jamshoro
Department of Civil Engineering

Title of Subject	:	<u>Environmental Engineering-I (Th + Pr)</u>	
Code	:	CE351	
Discipline	:	Civil Engineering (5 th Semester)	
Effective	:	18-Batch and onwards	
Pre-requisite	:	---	Co-requisite: ---
Assessment	:	Theory: 20% Sessional, 80% Written Semester Examination (20% Mid, 60% Final) Practical: 40% Sessional, 60% Final Examination	
Credit Hours	:	02 + 01	Marks : 50 + 50
Minimum Contact Hours:	:	30 + 45	

Course Learning Outcomes (CLOs):

Upon successful completion of the course, the student will be able to:

CLO	Description	Taxonomy Level	PLO
1	DESCRIBE the characteristics of potable water used in daily life, environmental legislations and management.	C2	1
2	DESIGN the water treatment plants and water distribution networks.	C6	3
3	PRACTICE various laboratory and field tests to obtain physical, chemical and biological properties of water.	P3	4

Course outline:

PART I. INTRODUCTION TO ENVIRONMENTAL ENGINEERING

Understanding the environment (basic concepts) and environmental engineering, Importance for civil engineers, Basic facts.

PART II. ENVIRONMENTAL LEGISLATION AND MANAGEMENT

Environmental issues of urban and rural areas, Environment and sustainable development, Role of various environmental agencies and NGOs to prevent environmental degradation, National Environmental Quality Standards (NEQS). Environmental Impact Assessment (EIA).

PART III. WATER SUPPLY ENGINEERING

Subject Overview, Water demands, Water quality, Water treatment.

- **Water Demands**

Various types of water demand, Estimation of water use: per capita demand, factors affecting water use, variations in demand and their effects on the design of a water supply project components, Design periods and factors governing design periods, Pollution forecast, and methods of population forecast, Water sources.

- **Water Quality**

Hydrological cycle and water quality, Water characteristics, Sampling methods, Water quality analysis, Water quality parameters/monitoring.

- **Water Treatment Unit Processes/Operations**



Mehran University of Engineering and Technology, Jamshoro

Department of Civil Engineering

Standard water treatment methods: screening, sedimentation, coagulation, filtration and disinfection, water softening, special water treatment methods.

- **Water Supply Projects**

Importance and necessity of planned water supplies, Planning and preparing a water supply project: data to be collected, analysis of data and project formulation, project drawings, project estimates, project supervision and reporting.

- **Water Collection**

Water collection methods, Intakes, factors governing location of intake, types of intake, design of intake.

- **Water Conveyance**

Conduit and its types, Pumps, types of pumps and design of a pumping Station.

- **Design of Water Treatment Plant**

Design of various water treatment unit operations: screens, plain sedimentation tanks, coagulant dose, coagulation-cum-sedimentation tanks/clarifiers/dissolved air floatation tanks, filters, chlorination dose, dewatering and sludge disposal.

- **Water Distribution**

Water supply system, Water distribution methods: requirements of a good distribution system, design of distribution systems forces (stresses) acting on pipes, materials for pressure conduits, pipe appurtenances, pipe fittings, laying and testing of water supply lines, Design of service reservoirs, Detection of water wastage in distribution pipes, House water connections.

Practical Work to be carried out:

1. Introduction of Environmental Engineering lab and HSE measures.
2. Sample preparation techniques including Dilution, Filtration/Centrifugation, Solid phase extraction, Digestion and Distillation.
3. To determine the Turbidity contents of given sample of water.
4. To determine the Suspended Solids / Non-filterable residue in sample of water.
5. To prepare different water samples of varying pH and Total Dissolved Solids (TDS) and to determine pH, TDS and Electrical Conductivity (EC) of prepared water samples.
6. To determine the Taste and Odour value of given water sample.
7. To determine the Acidity of given sample of water.
8. To determine the Alkalinity of given sample of water.
9. To determine the Hardness of given sample of water.
10. To determine the Chloride Concentration in given sample of water.
11. To determine the Sulphates in given sample of water.
12. To determine the Total Chlorine Concentration in given sample of water.
13. Determination of Jar Test (Alum dose selection) for turbid waters.
14. Determination of Dissolved Oxygen (D.O).
15. To perform an open-ended lab.



Mehran University of Engineering and Technology, Jamshoro
Department of Civil Engineering

Recommended Books:

1. Water Supply Engineering, S. K. Garg, Khana Publication Delhi. Latest Edition
2. Water Supply Engineering and Sewerage, E. W. Steel and T.J. Mcghee, Me Graw Hill Company, Latest Edition
3. Environmental Pollution and control, PAarne. Ves. Lined and J.Jaffery Peirce, Me Graw Hillinc USA, Latest Edition
4. Environmental Management, Dr. Biswaryo Mukherjee, Viskas Publishing House Pvt Ltd, Latest Edition

Approval:

Board of Studies:	Resolution No. 32.3	Dated: 03-10-2020
Board of Faculty:	Resolution No. 20.11	Dated: 07-10-2020
Academic Council:	Resolution No. 98.7(ii)	Dated: 22-10-2020



Mehran University of Engineering and Technology, Jamshoro
Department of Civil Engineering

Title of Subject	: <u>Linear Algebra and Numerical Methods</u>		
Course Code	: MTH 303		
Discipline	: CE		
Semester	: 5 th semester		
Effective	: F16 Batch onwards		
Pre-requisites	: F.Sc		
Assessment	: 20% sessional work	Mid-sem. Exam: 20%	End-Sem Exam: 60%
Marks	: TH: 100	PR: 50	
Credit Hours	: TH: 03	PR: 01	
Min. Contact Hours	: TH: 45	PR: 45	

Course Learning Outcomes

After completion of the course, student should be able to:

CLO	Description	Taxonomy Level	PLOs
1	Employ basic operations of matrix algebra and solution of system of linear equations.	C2	1,5
2	Compute non-linear equations and estimate interpolation and extrapolation	C2	1,5
3	Determine numerical solution of ordinary differential equations	C2	1,5

Assessment Methods of CLOs of Subject name

CLOS	Sessional Tests and Assignments	Mid Exam	Final Exam	Learning Levels	PLOs
CLO 1	20%	70%	10%	C2	1
CLO 2	40%	30%	30%	C2	1
CLO 3	40%	-----	60%	C2	1

Contents

Introductions to Matrices. Brief introduction of matrices. Symmetric and an matrices. Introduction to elementary row operations. Echelon and reduced echelon forms. Rank of a matrix. Inverse of a matrix using elementary row operations.

System of Linear Equations. System of non-homogeneous and homogeneous linear equations. Gaussian elimination method, Gauss Jordan method. Consistence criterion for solution of homogeneous and non-homogeneous system of linear equations. Application of system of linear equations.

Error Analysis: Introduction, floating points, errors, types of errors.

Solution of Non-Linear Equations: Bisection method, Regula-Falsi method, Newton-Raphson method, Fixed-point iterative method.

Solution of Linear Algebraic Equations: Iterative methods: Jaccobi's method, Guass-Seidal method.

Eigen Values and Eigen Vectors: Power method.

Interpolation and Extrapolation: Differences: Forward, backward, central, operators and their relations. Newton's forward interpolation formula. Newton's backward interpolation formula, Newton's divided difference formula, Lagrange's interpolation formula.

Numerical Differentiation: Newton's forward and backward differentiation formulae.

Numerical Quadrature: Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule.

Numerical Solution of Ordinary Differential Equations: Taylor series method, Euler's and its modified methods, Runge-Kutta methods

Books Recommended:

- **H.K. Dass, Engineering Mathematics**
- **B.S.Grewall, Higher Engineering Mathematics, Khanna Publishers, latest edition.**



Mehran University of Engineering and Technology, Jamshoro
Department of Civil Engineering

- **Erwin Kreyszig, Advance Engineering Mathematics, sixth edition, John wiley& sons, latest edition.**

Approval:	Board of Studies: 01/2018	Res. No. 01	Dated: 26-03-2018
	Board of FOST&H,	Res. No. 3.1	Dated: 11-04-2018
	Academic Council:	Res. No. 17 (ii)	Dated: 23-04-2018



Mehran University of Engineering and Technology, Jamshoro
Department of Civil Engineering

Title of Subject	:	<u>Project Management (Th)</u>	
Code	:	CE355	
Discipline	:	Civil Engineering (5 th Semester)	
Effective	:	18-Batch and onwards	
Pre-requisite	:	Nil	Co-requisite: Nil
Assessment	:	Theory: 20% Sessional, 80% Written Semester Examination (20% Mid, 60% Final)	
Credit Hours	:	02 + 00	Marks : 50 + 00
Minimum Contact Hours:		30 + 00	

Course Learning Outcomes (CLOs):

Upon successful completion of the course, the student will be able to:

CLO	Description	Taxonomy Level	PLO
1	DESCRIBE primary theoretical knowledge of Project Management in the field of Engineering and construction industry.	C2	11
2	DISCUSS essential theoretical knowledge of complete project life cycle of construction projects and their related issues.	C2	11

Course outline:

- Introduction to Engineering Management, Project Management, Objectives and Functions of management, Identification of Project, Project development and feasibility, identification of project stakeholders, SWOT analysis, Preparation and approval procedure of PC-1 and PC-2, Project Life cycle. Project roles and responsibilities, Design and project documentation, Introduction to Value Engineering & life cycle costing, Quality Management Systems, Human resource management, Procurement process and contractual relationship, Types of Engineering Contracts, Claims, Cost escalation, Arbitration and Litigation, Risk Analysis and management, Entrepreneurship and its types.

Recommended Books:

- Project Management- A managerial approach, Meredith, J.R and mantel S.J, John Wiley. Latest Edition
 - Human Resource Management in Construction, Langford, D, Longman Group Ltd, UK, Latest Edition
 - Construction Methods and Management, Nunnally S.W Prentice Hall, USA. Latest Edition
 - Principles of Construction Management Roy Pilcher, Mc Graw Hill Company, Latest Edition
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Approval:

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