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

Title of Subject	**:**	**Foundation Engineering (Th)**
Code	**:**	CE426
Discipline	**:**	Civil Engineering (8^{h} Semester)
Effective	**:**	17-Batch and onwards
Pre-requisite	**:**	Geotechnical Engineering **Co-requisite:**
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	DISCUSS soil investigation techniques, in situ tests and equipment.	C2	5
2	DESIGN shallow and pile foundations; and discuss earthen dam components including design parameters.	C6	3

Course outline:

- **Soil Exploration**
  Importance of soil exploration and planning of soil exploration program, Soil exploration methods: probing, test pits, auger boring, wash percussion and rotary drilling and geophysical methods, Soil samplers, Disturbed and undisturbed sampling, In situ tests: standard penetration test, cone penetration test, and field vane shear test, Coring of rocks, Core recovery and RQD. Borehole logs and sub soil exploration report.

- **Foundations**
  Purpose and types of foundations, Selection of foundation type, Types of bearing capacities of foundation, Gross and net pressures on footing, Design requirements for the foundations, Failure modes in foundations and their characteristics and criterion, General requirements for foundation design.

- **Shallow Foundations**
  Techniques to obtain bearing capacity of shallow foundations, Development of bearing capacity theory, Theories to calculate bearing capacity: Terzaghi's, Meyerhof's, Hansen's, Vesic's, Skempton's, Effects of water table, Design of strip, isolated, combined and raft footings, Elastic settlement of shallow foundations based on theory of elasticity, elastic and consolidation settlement of shallow foundations on saturated clays, settlement of sandy soil, Presumptive values, Plate load test

- **Pile Foundations**
  Introduction to deep foundations, Types of Deep foundations, Reasons to use piles, Classification of piles, Methods of installation, Load transfer mechanism of piles, Load carrying capacity of piles in different soils, Empirical relationships, Settlement of Piles, Pull out resistance of piles, Pile driven formulas, Negative skin friction, Pile load test, Group piles:
  Group efficiency, elastic and consolidation settlement of group piles, up lift capacity of group piles.

- **Foundation on difficult soils**
  Foundation on layered soils, foundation on collapsible soils, foundations on expansive soils.

- **Earthen Dams**
  Types of earthen dams, components and their functions, General design considerations and typical cross-section.

- **Introduction to relevant software**

Recommended Books:

- Foundation Analysis and Design, J.E Bowles, McGraw Hill Book Company, Latest Edition
- Foundation Engineering, B.M, Das, Brooks/Cole, Latest Edition
- Foundation Design and Construction, Tomilimson, ELBS, Latest Edition

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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 : **Environmental Engineering-II (Th)**
Code : 431
Discipline : Civil Engineering (8th Semester)
Effective : 17-Batch and onwards
Pre-requisite : Environmental Engineering-I **Co-requisite: -----**
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	DESCRIBE various characteristics of municipal and industrial wastewater and its composition, solid waste management, air and noise pollution.	C2	1
2	EXPLAIN wastewater collection and conveyance systems, understanding the management tools for solid waste reduction, reuse and recycling.	C2	2
3	DESIGN the wastewater treatment plant and manage the hazardous waste for societal and environmental sustainability.	C6	3,7

Course outline:

PART – I: WASTEWATER ENGINEERING

- **Wastewater Quality**
  Wastewater terminology, Characteristics of municipal industrial wastewater, Wastewater composition, Sampling techniques, Wastewater quality and analysis, Quality parameters/monitoring.

- **Wastewater Treatment Unit Processes/Operations**
  Estimating wastewater quantity, Conventional wastewater treatment systems, Municipal wastewater treatment unit processes: physical treatment methods, biological treatment methods, special/physico-chemical and chemical treatment methods, Sludge disposal and reuse, Wastewater reclamation and reuse, Natural treatment, Self-purification systems.

- **Design of a Wastewater Treatment Plant**
  Design of bar racks and screens, Grit chambers, Sedimentation tanks (detritus tanks, skimming tanks), Activated sludge processes, Aerated lagoons, Trickling filters, Rotating biological contractors, Stabilization ponds, Control of nutrients, Odour and VOCs control, Sludge thickeners and digesters, Composting units, Dewatering equipment, Wetlands.

- **Small Wastewater Treatment Systems**
  Small wastewater systems and characteristics, Design of on-site systems: septic tanks, imhoff tanks, pit latrines.

- **Wastewater Infrastructure (collection and conveyance)**
  Sewerage systems, Methods of carrying wastewater and its disposal: sewer materials, shapes, fittings and joints, design of sewers, laying and testing of sewers, ventilation of sewers, cleaning of sewers, surface drains, sewer appurtenances, House drainage system.

PART – II: SOLID AND HAZARDOUS WASTE MANAGEMENT

Characteristics of solid waste, Generation-collection-transferring and disposal of waste (incineration and landfill options), Waste minimization: recycling reuse of solid waste, composting, Hazardous waste: classification and treatment, Contaminated sites and their remedies.

PART – III: AIR AND NOISE POLLUTION

Air pollution: their origin, sources, types, effects, and dispersion, Control of air pollutants, Air emission measurement and control, Ambient air quality, Noise pollution: concept of sound and sound pressure level, noise sources and their effects on health, Acoustic environmental criteria (safety and health at work), Noise measurement and control.

Recommended Books:

- Environmental Engineering and management, Suresh K. Dhamejarg, Vikas Publishing House Pvt Ltd. Latest Edition
- Wastewater Engineering, Metcalf and Eddy, Tata Mc Graw Hill Publishing Company Ltd.
- Water Supply, Twort, Ac Twist. F.M. Low and FW Crowley Arnold International student Edition (AISE), Latest Edition

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

Title of Subject	**:**	**Construction Planning & Management (Th)**
Code	**:**	CE437
Discipline	**:**	Civil Engineering (8th Semester)
Effective	**:**	17-Batch and onwards
Pre-requisite	**:**	Project Management **Co-requisite: ----**
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	APPLY the knowledge of deterministic and probabilistic models for project planning and scheduling.	C3	11
2	APPLY the knowledge of value engineering and construction economics for appraisal of different construction projects.	C3	11

Course outline:

- **Introduction**
  Evolution of construction management, Construction industry players and their role, Type of construction project, Skills and responsibilities of construction managers, Construction economy and civil engineer.
- **Project Planning, Scheduling and Controlling**

  Deterministic Models: Construction activities, Work Break Down Structure (WBS), Gantt chart, Planning and Scheduling by using different Network Techniques, Activity on Arrow Diagram Method (AOA), Activity on Node Diagram Method (AON), Critical Path Method (CPM), Precedence Diagram Method (P.D.M.), Line of Balance (LOB) Technique, Scheduling of labor, materials, equipment and expenditure. Determining the minimum total cost of a project.

  Probabilistic Models: Project Evaluation and Review Technique (PERT). Graphical Evaluation and Review Technique (GERT). Determining mean, variance, standard deviation, probability and beta distribution. Identification of critical path.

  Resource Planning, Resource Loading, Resource Aggregation & Resource Levelling. Information and Knowledge Management

- **Software Application:** Introduction to software application in construction project management.

- **Value Engineering and construction economics**

  Value Engineering and its' phases, Life cycle costing, Making a value engineering study, Introduction to engineering economics, Economics Aspect for the Construction Industry, The time value of money, Project financial appraisal, Methods of economic comparison, Financing the project, Developing the cash flow diagram for the projects, Construction cost control, Depreciation, Cost-benefit analysis.

- **Construction Equipment and Management**

  Importance of equipment management in construction, Development in construction equipment, Types of construction equipment, Selection of construction equipment, Equipment economics, Factors influencing the productivity of equipment and their impact on cost.

Recommended Books:

- Principle of Construction Management, Roy Pilcher, MC Graw Hill Company, Latest Edition.
- Precedence and Arrow Net-working Techniques for Construction, Robert B. Harris, John Wiley and Sons, Latest Edition
- Construction Economics, Khairani Haji Ahmad, Pearson, C ustom Publishing, Latest Edition,
- Construction Planning, Equipment and Methods, Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C.J, McGraw Hill, USA, Latest Edition.

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

Title of Subject : **Drainage Engineering (Th)**
Code : CE442
Discipline : Civil Engineering (8th Semester)
Effective : 17-Batch and onwards
Pre-requisite : Irrigation Engineering **Co-requisite: ---**
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	CATAGORIZE the situations that necessitate drainage of agricultural lands.	C4	4
2	DESIGN, operate and maintain the surface and sub-surface drainage systems for sustainable agriculture.	C6	3,7

Course outline:

- **Introduction**
  Causes of waterlogging, Need for drainage, Objectives of land drainage, Benefits of drainage, Reclamation of waterlogged soils.
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- **Observation wells and Piezometers:**
  Difference between shallow monitoring wells and piezometers, Construction, location and installation of observation wells and piezometers, Reading water levels.

- **Factors related to drainage**
  Drainage requirement, Groundwater table, Depth to the water table, Dissolved salts in the groundwater, Measuring groundwater salinity, Hydraulic conductivity, Topography, Impermeable layers.

- **Design considerations of drainage systems**
  Drainage as part of an agricultural development project, Field drainage systems, Surface and subsurface drainage systems, Combined drainage systems, Components of a drainage system, Layout of field drainage systems, Outlet of a field drainage system, Design discharge, Slopes of field drains.

- **Surface drainage**
  Land forming- Bedding, Land grading and land planning, Field drains- Design of surface drains and construction of surface drains.

- **Subsurface drainage**
  Types of subsurface drainage systems, Design of subsurface drainage systems, Depth and spacing of field drains, Drainage coefficient, Pipes, Envelopes, Construction of pipe drainage systems, Construction methods, Alignment and levels, Machinery, Supervision and inspection, Interceptor drains.

- **Operation and maintenance**

Data of drainage works, Monitoring, Maintenance of Land surface, Open drains, Pipe drains, and Structures.

- **Major Drainage Projects of Pakistan**

- **Cross drainage structures**
  Introduction, Classification and design of cross drainage structures.

- **Sea water intrusion**

Recommended Books:

- Drainage of Irrigation Land: Irrigation Water Management, Training Manual No. 9, ILRI & FAO Land and Water Development Division, Latest Edition
- Land Drainage, Cambert K. Smendena and David W. Rycroft, Cornell University Press Ithaca, New York. Latest Edition
- Modern Land Drainage, Lambert K. Smedema and Willem F. Voltman, Latest Edition
- Drainage Engineering, James N. Luthin, Rober E., Krieger Publishers Company, New York. Latest Edition
- Drainage of Agricultural Land in Pakistan, Dr. Nazir Ahmed, Shahzad Nazeer Gulberg-III Lahore. Latest Edition
- Drainage Principles and Applications, H.P. Ritzema, ILRI Publication 16, Latest Edition

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