

Title of Subject	:	<u>Irrigation and Drainage Engineering (Th+Pr)</u>
Code	:	CE443
Discipline	:	Civil Engineering (8 th Semester)
Effective	:	20-Batch and onwards
Pre-requisite	:	Hydrology Co-requisite: NIL
Assessment	:	Theory: 20% Sessional, 80% Written Semester Examination (20% Mid, 60% Final) Practical: 40% Sessional, 60% Written Semester 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	DEMONSTRATE soil-water-crop relationships and various hydraulic structures.	C3	2
2	DESIGN irrigation canals and drainage system	C6	3
3	PRACTICE the field and software experimentation to verify crop water requirements for designing of irrigation scheduling.	P3	5

Course outline:

- **Soil-Water-Crop Relationship**

Introduction of irrigation, Soil and its physical and chemical properties, Root zone soil water, Crops of Pakistan and crop rotation.

- **Methods of Irrigation**

Irrigation methods, Factors affecting choice of irrigation methods, Pressurized and non-pressurized methods, Uniformity coefficient.

- **Water Requirement of Crops**

Functions of irrigation water, Standards for irrigation water, Terminology, Relationship between duty and delta, Factors affecting duty, Improving duty, Classes of soil water, Equilibrium points- soil moisture tension, Depth of effective root zone, Depth and Frequency of watering, Evapotranspiration, Irrigation efficiencies, Gross irrigation requirements.

- **Canal Irrigation System and Design of Irrigation Canals**

Alluvial and non-alluvial canals, Alignment of canals, Distribution system for canal irrigation, Determination of canal capacity, Canal losses and channel section for minimum seepage loss. Variables affecting flow in earthen channels, Kennedy's theory, Lacey's theory, Hydraulic design of earthen channels, Sediment transport, Tractive force method, Earthen canal section, Lined and its advantages, Types of lining with their merits and demerits, Hydraulic design of lined channels, Drainage behind lining, Super elevation, Discharge measurement in canals, Sediment measurement, Maintenance of canal section, Telemetry system.

- **Diversion Head Works**

Weir and barrage with their Functions, Components, and Design considerations, Canal head regulator, Silt excluding devices.

- **River Training Works**

Types, Guide banks, Marginal banks, Spurs, Pitched islands.

- **Canal Outlets**

Requirements of an outlet, Classification and description of outlets, Tail cluster and tail escape, Selection of the type of outlets.

- **Dams**

Types of dams and reservoirs, Storage zones of reservoirs, Storage capacity and yield of reservoir, Reservoir sedimentation and its control in reservoir, Economic height of dam, Factors governing the selection of type and site of dam.

- **Waterlogging and salinity**

Waterlogging and its causes, Optimum depth of water table, Salinity and its causes, Waterlogging and salinity management techniques.

- **Drainage methods**

Horizontal drainage, Tile drainage system and its design, disposal of drainage effluent, Installation of tile drains, Vertical (Tube well) drainage, Conditions required for vertical drainage, Design procedure of drainage tube wells.

- **Cross drainage structures**

Introduction, Classification of cross drainage structures and their description.

Practical work to be carried out

1. To investigate the effect of nozzle size on the radial distribution of water from a Rotary Sprinkler.
2. To investigate the effect of pressure on the radial distribution of water from a Rotary Sprinkler.
3. To investigate the effect of height of riser on the radial distribution of water from a Rotary Sprinkler.
4. To determine the Coefficient of uniformity for a drip irrigation system.
5. To construct flow net and investigate the seepage flow rate underneath a sheet pile wall.
6. To determine uplift pressure on foundation of hydraulic structure.
7. To change uplift pressure on foundation of hydraulic structure by changing length of flow lines.
8. To reduce or eliminate uplift pressure by providing drainage.
9. To measure discharge using Current meter.
10. To determine crop water requirement using CROPWAT.
11. To study the rainfall-runoff characteristics of multiple storm rainfalls.
12. To study the effects of reservoir storage on runoff hydrograph.
13. To draw a drawdown curve for a single well in an unconfined aquifer pumping at a constant discharge.
14. To draw a drawdown curve for a single well in a confined aquifer pumping at a constant discharge.
15. To perform an open-ended lab.

Recommended Books

- Irrigation and Drainage Engineering, Iqtidar H. Siddiqui, Oxford University Press, Latest Edition.
- Irrigation and Hydraulic Structures: Theory, Design and Practice, Dr. Iqbal Ali, Institute of environmental Engineering Research, NED University Karachi, Latest Edition.
- Irrigation Engineering and Hydraulic Structures, Santosh Kumar Garg, Khanna Publishers, Latest Edition.

- Irrigation and Waterpower Engineering, Dr. B. C. Punmia and Pande B. B. Lal, Standard Publishers, Delhi, Latest Edition
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Approval:

Board of Studies: 33

Board of Faculty: 23

Academic Council:

Resolution No. 33.3

Resolution No. 23.09

Resolution No.

Dated: 30-11-2021

Dated: 09-12-2021

Dated

Title of Subject	:	<u>Traffic Engineering and Pavement Design (Th + Pr)</u>
Code	:	CE451
Discipline	:	Civil Engineering (8 th Semester)
Effective	:	20-Batch and onwards
Pre-requisite	:	Transportation Engineering Co-requisite: Nil
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

Specific Objectives of Course:

- To equip students with knowledge related to Pavement design, construction, maintenance and traffic operations.

Course Learning Outcomes (CLOs):

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

CLO	Description	Taxonomy Level	PLO
1	APPLY basics of traffic engineering for effective traffic management.	C3	3
2	DESIGN Rigid and Flexible pavements.	C6	4
3	PRACTICE to investigate properties asphalt mix and capacity analysis of road segments.	P3	4

Course outline:

- **Traffic Engineering**
Introduction, Highway safety, Traffic control devices, Traffic sign, Traffic signals, Capacity Analysis, Traffic Management.
- **Pavement Design**
Introduction, Types of Pavements, Wheel loads, Equivalent Single Axle load, Repetition & impact factors, Design of flexible & rigid pavements, Constructions / Maintenance of pavement.
- **Asphalt Mix Design**
Importance of Asphalt mix design, Conventional and Performance based techniques and Design of Asphalt with Marshal Mix design method.

Practical Work to be carried out:

1. Introduction to Laboratory and HSE Measures.
2. To analyse the spot speed on selected road using different methods.
3. To carry out intersection traffic count including turning movement on an intersection using manual and camera technique.

4. To calculate Peak hour factor, ADT, AADT of any selected road section.
5. To calculate intersection delay at any selected signalised intersection.
6. To carry out parking study in any parking lot.
7. To determine the Los Angeles abrasion value (% wear) of aggregate sample.
8. To determine the flakiness and elongation index of aggregate.
9. To determine the stripping value of the given aggregate sample by static immersion method.
10. To determine the aggregate impact value of the given aggregate sample.
11. To determine the soundness of the aggregate using different chemicals.
12. To determine specific gravity, flash & fire point and ductility of bitumen.
13. To determine penetration grade and softening point of bitumen.
14. Determination of aggregate gradation for job mix formula.
15. Volumetrics of asphalt mix (open ended lab).

Recommended Books:

- The Design and a performance of Road Pavement, David Croney, HMSO London, Latest Edition
- Highway Engineering, Justo and Khanna, Publication Company, Delhi, Latest Edition
- Traffic engineering and Design, R. J Salter, McGraw Hill Book Company, Latest Edition
- ASHTO Standards, Vall& Valli, Latest Edition
- Traffic & Highway Engineering, Nicholas J Garber lester H. Hoel, Latest Edition
- Highway Engineering, Paul H. wright / Karen K Dixon, Latest Edition
- Transportation Engineering Introduction to Planning, Design and Operations, Jason C. Yu. Elsevier Science Ltd, Latest Edition

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Resolution No.

Dated: 30-11-2021

Dated: 09-12-2021

Dated

Title of Subject	:	<u>Construction Planning & Management (Th)</u>	
Code	:	CE438	
Discipline	:	Civil Engineering (8 th Semester)	
Effective	:	20-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	DISCUUS engineering contracts and procurement methods related to construction projects.	C2	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.

- **Equipment Planning and Management**

Importance of equipment management in construction, Development in construction equipment, Extent of mechanization and equipment planning in construction projects. Types of construction equipment, Factors influencing selection of construction equipment, Factors influencing equipment productivity, Productivity estimation and equipment planning.

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

- **Engineering contracts and procurement methods**

Different types of engineering contracts, Procurement methods and their selection, Procurement in project life cycle, Procurement guidelines, E-procurement in construction industry. Prequalification process, Preparation of bidding documents and NIT, Factors influencing contractor selection, Joint venturing, Public Private Partnership, Construction claims and dispute resolution.

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 Planning, Equipment and Methods, Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C.J, McGraw Hill, USA, Latest Edition.
- Smith G.R., (2003). Contracts and Claims. In: Chen, W.F. and Richard Liew, J.Y., The Civil Engineering Hand Book. Latest Edition. CRC Press LLC.
- Standard Procurement Document “Prequalification Document for Procurement of Works and User’s Guide”, The World Bank, Latest Version.
- FIDIC condition of contract for construction for Building and Engineering Works designed by the Employer, Multilateral Development Bank Harmonized Edition, Latest Version.

Approval:

Board of Studies: 33
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Academic Council:

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Resolution No.

Dated: 30-11-2021
Dated: 09-12-2021
Dated

Title of Subject	:	<u>Foundation Engineering (Th)</u>	
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