

Sixth Semester					Civil Engineering	
COURSE CONTENTS						
CE6301	Design of Steel Structures	L	T	P	Max. Marks	Min. Marks
Duration	5 Hours	3	0	1	70	22

Course Objective

To familiarize students about various aspects of steel designing and knowledge of Indian standards to design structural steel members.

UNIT - I

Study of IS-800 1984 & 2007 by design of structural connections – Bolted, Riveted and Welded connections both design methods.

UNIT - II

Design of compression members, tension members, Roof Trusses – Angular & Tubular, Lattice Girders.

UNIT - III

Design of simple beams, Built-up beams, Plate girders.

UNIT - IV

Effective length of columns, Design of columns – simple and compound, lacings and battens.

UNIT - V

Design of footings for steel structures, grillage foundation.

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Practical Work:

- (vi) Drawing of Riveted & Welded joints / connections.
- (vii) Drawing of design of Tension member with details of joints.
- (viii) Drawing of Compression members with details of joints.
- (ix) Drawing of design of Plate girder.
- (x) Drawing of design of Steel Beams.
- (xi) Drawing of Lacing System of Column.
- (xii) Drawing of Battened column.
- (xiii) Drawing of Gusseted base.
- (xiv) Drawing of Grillage foundation.

Course Outcomes

- Apply the IS code of practice for the design of steel structural connections. Analyze the behavior of bolted and welded connections.
- Designing of compression and tension members.
- Designing of simple beam, built up beams, lattice and plate girders.
- Designing of simple and built-up column and stiffening of columns by use of splicing, lacing and battens.
- Designing of footings for steel structures and grillage foundation

Reference Books :

- (i) Design of Steel Structures by Arya & Azmani Nemchand & Bros, Roorkee.
- (ii) Design of Steel Structures by P. Dayaratnam.
- (iii) Design of Steel Structures Vol. I&II by Rmchandra.
- (iv) Design of Steel Structures by L.S. Negi.
- (v) Design of Steel Structures by Ramammutham.
- (vi) Design of Steel Structures by Punmia.



Sixth Semester					Civil Engineering	
COURSE CONTENTS						
CE 6302	Soil Mechanics	L	T	P	Max. Marks	Min. Marks
Duration	6 Hours	3	1	1	70	22

Course Objective

To familiarize students about the various principles of soil mechanics and develop technical proficiency for the engineering problems related to soil.

UNIT - I

Basic Definitions & Index Properties: Definition and scope of soil mechanics, Historical development. Formation of soils. Soil composition. Minerals, Influence of clay minerals on engineering behaviour. Soil structure. Three phase system. Index properties and their determination, relationship and interrelationship. Consistency limits. Classification systems based on particle size and consistency limits.

UNIT - II

Soil Water and Consolidation: Soil water, Permeability Determination of permeability in laboratory and in field. Seepage and seepage pressure. Flow nets, uses of a flow net, inverted filters, Effective, neutral and total stresses.

Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one dimensional consolidation. Consolidation test, Fitting Time curves. Normally and over consolidated clays. Determination of pre-consolidation pressure, settlement analysis. Calculation of total settlement.

UNIT - III

Stress Distribution in Soils and Shear Strength of Soils: Stress distribution beneath loaded areas by Boussinesq and water gaurd's analysis. Newmark's influence chart. Contact pressure distribution.

Mohr-Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Triaxial compression test, unconfined compression test, Value shear test, Measurement of pore pressure, pore pressure parameters, stress path & application, critical void ratio, Liquefaction.

UNIT - IV

Stability of Slopes: Infinite and finite slopes. Types of slope failures, Rotational slips. Stability number. Effect of ground water. Selection of shear strength parameters in slope stability analysis. Analytical and graphical methods of stability analysis. Stability of Earth dams.

UNIT - V

Lateral Earth Pressure: Active, passive and earth pressure at rest. Rankine, Coulomb, Terzaghi and Culmann's theories. Stress distribution soil. Analytical and graphical methods of determination of earth pressures on cohesionless and cohesive soils. Effect of surcharge, water table and wall friction. Arching in soils. Reinforced earth retaining walls.

Laboratory Work: Laboratory work will be based on the above course as required for soil investigators of engineering projects.

List of Experiment :

- (1) Determination of Hygroscopic water content.
- (2) Particle – size analysis.
- (3) Determination of Specific gravity of soil particles.
- (4) Determination of plastic limit.
- (5) Determination of liquid limit.
- (6) Determination of shrinkage limit.
- (7) Permeability tests.
- (8) Direct shear test (Triaxial Compression Test).
- (9) Consolidation test.
- (10) Triaxial compression test.
- (11) Laboratory Vane Shear test.

Course Outcomes

After this course the students will be able to:

- CO1 Understand the formation, properties and phase relationships of soil.
- CO2 Classify the soil based on particle size and index properties.
- CO3 Illustrate the concepts related to soil stresses, permeability, seepage, consolidation and settlement.
- CO4 Demonstrate the importance of shear strength parameters for engineering applications.
- CO5 Interpret the stability of slopes applying different geotechnical concepts
- CO6 Illustrate the earth pressure theories and their application in engineering problems.

Reference Books:

- (i) Soil Mechanics & Foundation Engineering by Dr. K.R. Arora - Std. Publishers Delhi.
- (ii) Soil Mechanics & Foundation by Dr. B.C. Punmia- Laxmi Publications, Delhi.
- (iii) Modern Geotech Engineering by Dr. I. Aram Singh - IBT Publishers, Delhi.
- (iv) Geotech Engineering by C. Venkatramaiah - New Age International Publishers, Delhi.
- (v) Soil Mechanics & Foundation Engineering by S.K. Garg- Khanna Publishers, Delhi.
- (vi) Soil Testing for Engineering by T.W. Lambe - John Wiley & Sons. Inc.
- (vii) Relevant I.S. Codes.

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Sixth Semester						Civil Engineering	
COURSE CONTENTS							
CE6321	Advance RCC	L	T	P	Max. Marks	Min. Marks	
Duration	6Hours	3	1	1	70	22	

Course objective:

Student will get familiar with the design of combined footing and deep foundation and raft footing, retaining walls, underground water tanks and overhead water tanks, multistory frame and basics of prestress concrete structures.

UNIT – I

Design of Combined footing, deep foundation, raft footing.

UNIT – II

Earth Retaining Structures : Cantilever and counter fort types retaining walls.

UNIT – III

Water Tanks : Tanks on ground and underground tanks: square, rectangular, circular tanks, Overhead tanks: square, rectangular, Circular & intze tanks.

UNIT – IV

Design of Multistory Buildings - Sway and non sway buildings, Shear walls, Silos and Bunkers.

UNIT – V

Introduction to prestress design. Design of RCC and prestress bridge.

Course Outcomes

After this course the students would have understood :

- Designing of combined footing and deep foundation and raft footing.
- Designing of cantilever and counterfort retaining walls.
- Designing of different types of ground and underground water tanks and overhead water tanks.
- Designing of silos, bunkers and shear wall in multistory frame
- The concept of prestress design and design of prestress RCC bridge.

List of Practical :

- (i) One Sheet of Drawing on Combined Footing.
- (ii) One Sheet of Drawing on Raft Footing
- (iii) One Sheet of Drawing on Cantilever Retaining Wall with details.
- (iv) One Sheet of Drawing on Counter Foot Retaining wall with details.
- (v) One Sheet of Drawing on Rectangular Ground Water Tank.
- (vi) One Sheet of Drawing on Elevated Intze Tank.
- (vii) One Sheet of Drawing on Shear Wall
- (viii) One Sheet of Drawing on Bunkers.
- (ix) One sheet of Drawing on Silo.
- (x) One Sheet of Drawing of Different Elements of RCC culvert

Reference Books :

- (vi) R.C.C. by O.P. Jain, Vol.II.
- (vii) R.C.C. by B.C. Punmia.
- (viii) Essentials of Bridge Engineering – D.J. Victor.
- (ix) Bridge Engineering – Ponnuswamy.
- (x) Advanced R.C.C. Design by N.K. RAJU.
- (xi) N. Krishna Raju, Pre – stressed Concrete, tata McGraw Hill, New Delhi.
- (xii) Pre stresses concrete – T.Y. Lin.

Sixth Semester Elective					Civil Engineering	
COURSE CONTENTS						
CE6351	Wastewater Engineering for Recycling & Reuse	L	T	P	Max. Marks	Min. Marks
Duration	5Hours	3	0	1	70	22

Course Objectives:

1. To basic terms in wastewater engineering
2. To illustrate quantitative and qualitative aspects of wastewater
3. To explain the hydraulic considerations and procedure adopted in the sewer design.
4. To illustrate the standards for disposal of sewage and affects on quality of receiving streams on disposal.
5. To examine and understand the characteristics of wastewater for determining their suitability for reuse.
6. To elucidate the various considerations, unit operations and unit processes adopted in wastewater treatment

UNIT - I

Basic terms of Wastewater Engineering, Sewerage systems and their choice, collection, transmission, quantification of sewage, design of sewer, laying and testing of sewers, sewer appurtenances, pumps and pumping stations.

UNIT - II

Characteristics and analysis of wastewater: physical, chemical & biological parameters, introduction to wastewater disposal, self purification of streams, oxygen sag analysis, effluent disposal methods and discharge standards.

UNIT - III

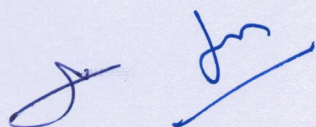
Constituents of wastewater, Unit operations and unit process for wastewater treatment, preliminary and primary treatment systems, introduction to environmental microbiology and its relevance to biological treatment.

UNIT - IV

Biological treatment of wastewater: suspended and attached culture systems, ponds & lagoons, on site treatment systems: septic tank and Imhoff tank, tertiary and advanced treatment systems, sludge processing and disposal.

UNIT - V

Introduction to industrial wastewater, emerging approaches for management, options for recycling and reuse of wastewater, considerations for planning and choice of suitable treatment systems, successful case studies in India and abroad



Course Outcomes:

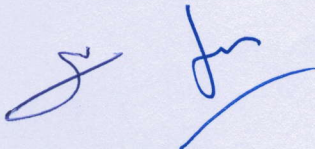
- CO1 Plan and estimate the quantitative requirements for a sewerage system.
- CO2 Design, plan design construct and test in a given sewer section.
- CO3 Analyze the wastewater for determining its suitability for its potential reuse/disposal.
- CO4 Organize and design different unit processes and unit operations in wastewater treatment.
- CO5 Predict the possible issues and considerations in recycling and reuse of wastewater.

List of Experiment:

- 1 To Study the Different Sampling Techniques for Collection of Representative Sample.
- 2 To Study Standards for Discharge of Environmental Pollutants.
- 3 To Determine pH and Turbidity of Given Wastewater Sample.
- 4 To Determine Total Solids, Suspended Solids and Dissolved Solids in Given Wastewater Sample.
- 5 To Determine Settleable Solids, Fixed and Volatile Solids Content in Given Wastewater Sample.
- 6 To Determine Chlorides Content in Given Wastewater Sample.
- 7 To Determine Acidity and Alkalinity in Given Wastewater Sample.
- 8 To Determine Dissolved Oxygen Content in Given Wastewater Sample.
- 9 To Determine the Biochemical Oxygen Demand of the Given Wastewater Sample.
- 10 To Determine Chemical Oxygen Demand of the Given Wastewater Sample.

TEXT BOOKS:

1. Manual on "Sewerage and Sewage Treatment ", CPHEEO, Ministry of Urban Development, GOI, New Delhi
2. Sewage Disposal and Air Pollution Engineering by S.K. Garg, Khanna Publishers. .
3. Environmental Engineering by Peavy, Rowe and Tchobanoglous, McGraw-Hill international Editions
4. Wastewater Engineering: Treatment, Disposal And Reuse by Metcalf Eddy, McGraw-Hill editions.
5. Standard Methods for the Examination of Water and Wastewater. 20th ed., American Public Health Association, Washington DC, USA.
6. Wastewater Treatment For Pollution Control And Reuse by Archievala & Shyam R. Asolekar, Tata Mcgraw Hill



Sixth Semester				Civil Engineering		
COURSE CONTENTS						
ME6351	Hydro Systems	L	T	P	Max. Marks	Min. Marks
Duration	5 Hours	3	0	1	70	22

Course Objective:

Students will get familiar with Water flowing in various conditions like open channels weirs, canals systems.

UNIT-I

Open channel flow in rigid boundary channels- Comparison with pipe flow, Classification of flow, uniform flow – Equations for uniform flow such as Chezy's and Manning's formula, Most efficient channel section – Circular, Rectangular, and Trapezoidal channel sections, Velocity distribution in open channels, Conveyance, Normal depth, Hydraulic exponent for uniform flow, Determination of normal depth and velocity, Specific energy and Specific force diagrams, Critical flow, Hydraulic exponent for critical flow, Channel transitions, Venturi, Standing wave and Parshall flumes.

UNIT- II

Non-uniform flow, Basic assumptions, Gradually Varied Flow, Dynamic equation for gradually varied flow, Different forms of the dynamic equation, Flow profiles in prismatic channels, Computation of the length of the backwater curve - Graphical Integration and Direct Step Methods. Rapidly Varied Flow- Hydraulic Jump, Hydraulic jump equations for a rectangular channel, Practical applications, Energy loss and efficiency of a jump, Stilling Basins, Selection of Stilling Basins, Rapidly varied unsteady flow – Surges.

UNIT-III

Distribution works - Classification of canals, Canal alignment, Considerations for fixing longitudinal slope, Typical canal cross sections in embankment and filling, Cross sections of irrigation canals as per BIS codes, Maintenance of canals,

UNIT-IV

Canals in alluvial soils – Regime Theory - Kennedy's and Lacey's Theories, Silting in canals, Scour and protection against scour. Canal lining - losses in irrigation canals, Advantages and disadvantages of lining, Types of lining. Water logging- Causes & preventive measures. Drainage – Open and Closed Drains.

UNIT-V

Components of a distribution system (no detailed design) - Head and Cross Regulator, Canal Falls, Canal Outlets, Cross Drainage Works, Canal Escapes- Surplussing arrangements in minor irrigation tanks.

Experiments

1. To study the hydraulic controls rig.
2. To conduct an experiment for verifying model laws
3. To study the cavitations phenomenon in turbines.
4. Study of hydraulic couplings and torque converters.

Course Outcomes

After this course the students will be able to:

- CO1 Understand the applications of open channel flow.
- CO2 Understand the concepts of non-uniform flow.
- CO3 Understand the design of canal works.
- CO4 Understand the design theories of canals.

References:

- K. Subramanya, Flow in Open Channels, 3rd ed., Tata McGraw Hill, New Delhi (2008).
- P. N. Modi, Irrigation, Water Resources & Water Power Engineering, 2nd ed., Standard Book House, New Delhi (2009)
- Srivastava, Flow through Open Channels, Oxford University Press, New Delhi (2008).
- Todd, D.K., Ground Water Hydrology, 2nd ed., Wiley India, New Delhi (2008)

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