रख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

Khwaja Moinuddin Chishti Language University, Lucknow, U.P. (India)

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DEPARTMENT OF CIVIL ENGINEERING

STRUCURAL ANALYSIS-II

SUBJECT CODE: CE 501

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. To give the ability to analysis of indeterminate structure
2. To give an ability to calculate shear force and bending moment of objects under external loadings.
3. To give an ability to apply the knowledge of structure analysis on engineering applications and design problems.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	To know the two hinge and three hinge arches, analysis of aches problem
CO-2	Apply the concept of stiffness matrix method
CO-3	Apply the basic of concept of plastic analysis
CO-4	Apply the concept of flexibility method
CO-5	To know the concept of approximate method and Kani's method

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STRUCTURAL ANALYSIS - II

SUBJECT CODE: CE-501

Unit	Topic
I	Analysis of Arches: Two hinged and three hinged parabolic arches - circular arches, cables - tension forces in towers - influence line for horizontal thrust and bending moment
II	Stiffness Matrix method , Stiffness matrix for beam element - analysis of continuous beams - plane frames & pin jointed plane trusses.
III	Plastic Analysis , plastic moment of resistance - shape factor, collapse load - analysis of continuous beams and portals – limiting conditions for applications
IV	Flexibility Matrix method , Concept of flexibility matrix - analysis of continuous beams - plane frames and pin jointed plane trusses.
V	Approximate methods for multistoried frames , Substitute frame method - portal method - cantilever method and Kani's method.

Text/ Reference Books:

1. V.N. Vazirani & M.M. Ratwani (2000), Analysis of Structures, Khanna Publishers, New Delhi.
2. G.S. Pandit & Gupta S.P (1998), Structural Analysis (A matrix approach), Tata McGraw Hill Publishing Ltd
3. 3.Negi.L.S (2002), Theory & Problems in Structural Analysis, Tata McGraw Hill Publishing House

DEPARTMENT OF CIVIL ENGINEERING

GEOTECHNOLOGY-I

SUBJECT CODE: CE 502

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. To know the basic properties of soil and origin of soil
2. To give an ability to calculate shear strength and bearing capacity of soil
3. To give an ability to apply the knowledge of soil test and soil related problems.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	To understand the properties of soil and structure of soil, origin of soil
CO-2	To know the calculation of permeability of soil
CO-3	To analysis of stress distribution of soil
CO-4	To know the compressibility of soil and method
CO-5	To know the concept of shear strength and bearing capacity of soils

GEOTECHNOLOGY – I
SUBJECT CODE: CE-502

Unit	Topic
I	**Introduction:** Origin and formation of soils, various soil deposits in India and their characteristics. Identification and classification of soils; particle size and plasticity of soils, mechanical and hydrometer analysis, limit of consistency and their determination, Unified and I.S. Soil classification system, 3-phase system of soils; weight, volume and unit weight relationships and their inter-relationships. Effective stress principle; stress distribution with depth, influence on effective stress due to shift in water table and capillarity.
II	**Soil characteristics:** Permeability; factors affecting permeability; Darcy's law, laboratory tests and their suitability, Field method for determination of Permeability, Laplacian equation, flow nets for confined and unconfined flows, effective stress under hydrodynamic conditions, quick sand condition, Filters and Drains.
III	**Stress distribution:** Stress below point load (Bousinessq's and Westergaard's equations), stresses below uniformly loaded circular and rectangular areas (exact method), approximate methods – point load and 2: 1 methods, Newmark's chart. Compaction; filed and laboratory compaction devices, filed compaction controls; core-cutter, sand replacement & Proctor needle methods to determine in-situ density of soils, moisture-density relationship, effects of compaction on properties of soils.
IV	**Compressibility of soils:** Factors affecting compressibility, 1-D consolidation theory, consolidation test and determination of av, cc, mv i cv, pre-consolidation pressure and over consolidation ratio, square root of time and logarithmic time fitting methods, secondary consolidation, predicting settlements and time rates.
V	**Shear strength:** Concept of shear strength in soils, Mohr's stress circle, Coulomb's failure envelope, stage of failure and plane of failure, cohesion intercept, angle of shearing resistance, shear strength equation in terms of principal stress, measurement of shear strength of soils by direct shear test, triaxial compression tests, unconfined compression test, vane shear test and presentation of their results. Performing shear strength tests under different drainage conditions (drained, undrained and consolidated undrained), basic features of triaxial compression test apparatus, pore water pressure parameters. Sensitivity of clays, Thixotrophy and critical void ratio

Text/ Reference Books:

1. Soil Mechanics and Foundation by Punmia, Jain and Jain; Laxmi Publications (P) Ltd.
2. Engineering Properties of Soils by S K Gulati, Tata McGrawhill.
3. Dr.K.R.Arora (2001), Soil Mechanics and Foundation Engineering, Standard Publishers, Delhi – 110 006.
4. Donald P Coduto (2002), Geotechnical Engineering Principles and practices, Pearson Education Ltd.

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DEPARTMENT OF CIVIL ENGINEERING

CONCRETE STRUCTURE-I

SUBJECT CODE: CE 503

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. This course deals with the contemporary professional aspects in the analysis, design and construction of Concrete Structures along with the basic understanding of fundamental concepts.
2. To give an ability to apply the knowledge of structure design on engineering applications and design problems

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	To know the Basic concept of design approach, working stress and limit state method of design
CO-2	Analyse and Design RCC beams for flexure by IS methods
CO-3	Analyse and Design RCC beams for shear by IS methods.
CO-4	Analyse and Design RCC slabs and staircase by IS methods
CO-5	Design the RCC compression members by IS methods.

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CONCRETE STRUCTURE -I
SUBJECT CODE: CE-503

Unit	Topic
I	Attributes of structural design, material properties of RCC making materials, Basic design approach, working stress and limit state method of design, assumptions, analysis and design of a rectangular singly and doubly reinforced section by working stress design method.
II	Assumptions in limit state design method, codal recommendations, design of a rectangular , singly & doubly reinforced section, T & L sections by limit state method.
III	Behavior of RCC beams in shear, shear strength of beam with and without shear reinforcement, minimum and shear reinforcement, design of beam in shear using limit state method. Nature of bond between steel and concrete, development of bond stress in reinforcement, concept of development length and anchorage, design of RCC section in bond and calculations of development length using limit state method.
IV	One way solid slabs, simply supported and continuous. Two way slabs: simply supported and continuous. Types of RCC stairs, loads and load effects on stairs, design of stairs spanning transversally & longitudinally. Short & long term deflections, calculation of total deflection & estimation of probable maximum crack with using codal provisions & established theories.
V	Classifications of compression members, codal provisions relating to design of RCC columns, effective length of RCC columns, minimum eccentricity, design of axially loaded, uniaxially loaded and biaxially loaded short columns by limit state methods

Text/ Reference Books:

1. S. Ramamrutham & R. Narayanan (2004), Design of reinforced concrete structures, Dhanpat Rai Publishing.

2. Varghese (2005), Advanced Reinforced Concrete Design, Prentice-Hall of India. Gurcharan Singh (2005),

3. Design of R.C.C. Structures in S.I.Units, Standard Publishers Distributors.

4.B.C.Punmia (2003), Design of reinforced concrete structures, Lakshmi Publishers.

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DEPARTMENT OF CIVIL ENGINEERING

TRANSPORTATION ENGINEERING-I

SUBJECT CODE: CE 504

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. To impart the basic knowledge, skills and attitudes of planning highway networks
2. Designing highway geometrics; design intersection and prepare traffic management plans
3. Designing flexible and rigid pavements; understanding the principles of construction and maintenance of highways.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understand the history of road development, their alignment & Survey, Design the various geometric parameters of road.
CO-2	Study the traffic characteristics & design of road intersections & signals.
CO-3	Examine the properties of highway materials & their implementation in design of pavements.
CO-4	Learn methods to construct various types of roads
CO-5	Learn methods to construct the hill roads and maintenance

TRANSPORTATION ENGINEERING - I
SUBJECT CODE: CE-504

Unit	Topic
I	Introduction: Role of transportation in society, modes of transportation, History of road development, Highway planning and its necessity, road types and patterns, road alignment. Geometric design: cross sectional elements, sight distance Horizontal and vertical alignment: all pertinent elements, super elevation, extra widening transition curves, setback distance, gradient.
II	Traffic engineering: Traffic Characteristics, traffic engineering studies, traffic flow and capacity, traffic regulation and control; design of road intersections; design of parking facilities; highway lighting; problems. Parking facilities: surface and multi-level parking.
III	Pavement: Materials used in Highway Construction- Soils, Stone aggregates, bituminous binders, bituminous paving mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements. Problems
IV	Road construction methods: WBM, surface dressing, bituminous carpeting, bituminous boaund macadam and asphaltic concrete, cement concrete roads, evaluation and overlays design, highway maintenance and drainage.
V	Hill roads: General consideration, alignment of hill roads, geometrics of hill roads, design and construction of hill roads, drainage in hill roads, maintenance problems in hill roads. Highway economic and finance: Introduction, highway user benefits, highway cost, economic analysis.

Text/ Reference Books:

1. Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Revised 10th Edition, Nem Chand & Bros, 2017.

2. Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Khanna Publishers.

3. Partha Chakraborty, ' Principles Of Transportation Engineering, PHI Learning,

4. Paul H. Wright and Karen K. Dixon, Highway Engineering, 7th Edition, Wiley Student Edition, 2009

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DEPARTMENT OF CIVIL ENGINEERING

ENGINEERING GEOLOGY

SUBJECT CODE: CE 505

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. To impart the basic knowledge, skills and attitudes of understanding weathering and mass movements
2. To distinguish different geological formations; of identifying sub-surface information and groundwater potential sites
3. To apply geological principles for mitigation of natural hazards and select sites for dams and tunnels

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understand the scope of geological studies.
CO-2	Understand the rocks and its engineering properties.
CO-3	Understand the minerals and constituents of rocks.
CO-4	Understand the rock deformations, their causes effects and preventive measures.
CO-5	Understand the ground water reserves, GIS methods and site selection for mega projects

ENGINEERING GEOLOGY
SUBJECT CODE: CE-505

Unit	Topic
I	Minerals and Rocks: Relevance and importance of Engineering Geology of Civil Engineers, Minerals, their physical properties - rock forming minerals, physical and engineering properties of igneous, metaphoric and sedimentary rocks.
II	Interior and Structures of earth Earth's interior based on seismic models, plate tectonics and continental drift, study of earth's structures – fold, faults and joints, geological factors affecting Civil Engineering constructions, geological maps, and their uses
III	Weathering and Soils The atmosphere, rock decay and weathering, soil origin and formation – classification and its engineering importance, slope stability – rock and soil slopes stability analysis –landslides - cause and remedial measures
IV	Ground Water Characteristic of ground water, hydrogeological cycle, types of aquifers, water level fluctuations, surface and subsurface geophysical methods, groundwater contamination, artificial recharge of groundwater and harvesting of rainwater.
V	Earth Processes and Remote sensing Brief description on – geological hazards -cause and formation of flood, cyclone, Volcano, earthquake, tsunami,– Introduction to Remote sensing and Geographical Information System

Text/Reference Books

1. 2nd Edition 2. Parbin Singh,(2010), Engineering & General Geology, S.K.Kataria and Sons-Delhi, 7th Edition.
2. H.H.Reed and F. Rutly (1960), Elements of Mineralogy, Thomas Murby, London.
3. Blyth – Edward Arnold F.G.H (1998), A Geology for Engineers, (7th Edition).

DEPARTMENT OF CIVIL ENGINEERING

MAINTENANCE AND REHABILIATION OF STRUCTURES

SUBJECT CODE: CE 506

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. To impart the basic knowledge, skills and attitudes of understanding weathering and mass movements
2. To distinguish different geological formations; of identifying sub-surface information and groundwater potential sites
3. To apply geological principles for mitigation of natural hazards and select sites for dams and tunnels

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understand the fundamentals of maintenance and repair strategies
CO-2	Identify for serviceability and durability aspects of concrete.
CO-3	Know the materials of corrosion resistance
CO-4	Decide the appropriate repair and retrofitting techniques.
CO-5	Know the materials and techniques used for repair of structures.

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MAINTENANCE AND REHABILITATION OF STRUCTURES

SUBJECT CODE: CE-506

Unit	Topic
I	Quality assurance for concrete construction, as in built concrete properties, strength, permeability, volume changes, thermal properties, cracking, effects due to climate, temperature, chemical wear and erosion.
II	Design and construction errors, corrosion mechanism, effects of cove thickness and cracking, methods of corrosion protection, inhibitors, resistant steels, coatings, cathodic protection.
III	Inspection, structural appraisal, economic appraisal, component of quality assurance, conceptual basis of quality assurance schemes, special concrete and mortar, concrete chemicals, special elements for accelerated strength gain, expansive cement, polymer concrete, suplhur infiltrated concrete, ferro cement, fiber.
IV	Rust eliminators and polymers coating for rebars during repairs, foamed concrete, mortar and dry pack, vacuum concrete, gunite and shotcrete epoxy injections, mortar repair for cracks, shoring and underpinning.

Text/ Reference Books:

1. Maintenance of engineering and management by K Venkataraman.
2. Maintenance of building by A.C. Panchdhari.

STRUCTURE ANALYSIS LAB
SUBJECT CODE: CE-551

L-T-P: 0-0-2
Credit: 1

1. To determine flexural rigidity (EI) of a given beam.
2. To verify Maxwell's reciprocal Theorem.
3. To find horizontal thrust in a two hinged arch and to draw ILD for horizontal thrust and bending moment.
4. To find deflection of curved members
5. To find critical loads in struts with different end conditions.
6. To find deflection of unsymmetrical bending.
7. To find carry over factor for the beam with far end fixed.
8. To find bar forces in elastically coupled beam.

TRANSPORTATION ENGINEERING LAB
SUBJECT CODE: CE-552

L-T-P: 0-0-2
Credit: 1

1. Test on a aggregates

i. Strength test
ii. Abrasion test
iii. Shape test
2. Test on bituminous materials

i. Penetration point test
ii. Softening point test
iii. Stripping value test
iv. Ductility test

3. Determination of Traffic volume

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ENGINEERING GEOLOGY LAB

SUBJECT CODE: CE – 553

L-T-P: 0-0-2
Credit: 1

1. Minerals: Spotting: identification of minerals, hand specimen with their characteristics features such as color, streak, hardness, specific gravity and luster.

2. Rocks: Spotting: identification of minerals, hand specimen with their characteristics features such as color, streak, hardness, specific gravity and luster.

3. Geological Maps: To mark dip of the beds, folds, fault, unconfomotities of the given map and also draw the profile

4. Soil: Identification of soil such as sand, silt, and clays on the basis of sieve analysis and visual observations

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SURVEY CAMP
SUBJECT CODE: CE 554

L-T-P: 0-0-2
Credit: 1

The purpose of the camp is to train students in using modern surveying techniques and equipment such as GPS, total stations, automatic and digital levels, electronic Theodolite, etc. to prepare a detailed digital map. The course will be run in the form of a camp for 7 working days and will involve the following components:

1. Reconnaissance of the area to be mapped.
2. Control establishment: Observations and Adjustment using GPS and/or Total stationtraverse to yield adjusted coordinates of control points.
3. Detail digital mapping using Total station/GPS.
4. Preparing a digital map using open source mapping software and report writing

DEPARTMENT OF CIVIL ENGINEERING

ENVIRONMENTAL ENGINEERING-I

SUBJECT CODE: CE 601

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. To impart the basic knowledge, skills and attitudes of analyzing the characteristics of water and wastewater

2. To estimating the quantity of drinking water and domestic wastewater generated

3. To design the components of water supply systems; designing of sewerage system.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Assess water demand and optimal size of water mains.
CO-2	Layout the distribution system & assess the capacity of reservoir.
CO-3	Investigate physical, chemical & biological parameter of water.
CO-4	Design treatment units for water and waste water.
CO-5	Apply emerging technologies for treatment of waste water.

ENVIRONMENTAL ENGINEERING - I
SUBJECT CODE: CE - 601

Unit	Topic
I	Water demand: Types of demands, factors affecting per capita demand, variations in demand; Population forecasting; Sources of water supply: estimation of water quantity, factors governing the selection of source; Water conservation measures.
II	Intakes: Types of intakes, factors governing the location of intake; Reservoirs: types of reservoirs, capacity of reservoir; Water distribution system: requirements of a good distribution system, methods of distribution, layout and design of water supply systems; Pipes: types of pipes for transporting water, pipe appurtenances, testing of pipelines.
III	Water Quality: Physical chemical and microbiological water quality parameters and their significance; Water borne diseases and their control; drinking water quality criteria and standards; Natural processes occurring for self-cleansing of water bodies; Engineered systems of water treatment.
IV	Aeration: Mechanics of gas transfer, types of aerators, applications of aeration; Sedimentation: theory of sedimentation, design of sedimentation tank, types of sedimentation tanks; Coagulation: theory of coagulation, types of coagulants and coagulant aids, and flocculation, design of flocculation tank.
V	Water softening: Chemical precipitation, ion exchange; reverse osmosis; Filtration: theory of filtration, types of filters and their classification, filter operations; disinfectioning: types of disinfectants, chlorination; Site selection for treatment plant; layout considerations for treatment plant; Operation and maintenance of treatment plants.

Text/ Reference Books:

1. Water Supply Engineering, Garg,Khanna Publishers.
2. CPHEEO, Manual on Water Supply and Treatment, Min. of Urban Dev., Govt. of India.
3. BIS, SP 35: Handbook on Water Supply and Drainage, Bureau of Indian Standards.
4. Droste R.L., (1997)., Theory and Practice of water wastewater treatment, John Wiley & sons

DEPARTMENT OF CIVIL ENGINEERING

GEOTECHNOLOGY-II

SUBJECT CODE: CE 602

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. To impart the basic knowledge, skills and attitudes of analyzing the shallow and pile foundation

2. To estimating the improvement of bearing capacity

3. To design the components of earth retaining structures

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Analyze bearing capacity and settlement of soil for shallow foundation
CO-2	Design the various types of pile foundation and understand the basics of pile foundation
CO-3	Understand the concept of earth pressure
CO-4	understand the basics of pile foundation
CO-5	Understand the design concept of machine foundation

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GEOTECHNOLOGY - II
SUBJECT CODE: CE -602

Unit	Topic
I	Types and general requirements of shallow foundation: Bearing capacity consideration, effect of ground water table, modes of failure, settlements of foundations, I.S. Code recommendations. (I.S. 6403, 8009). Design aspects of shallow foundation. Improvement of bearing capacity (sand drains, compaction and dewatering of soils).
II	Types, purpose and classification of pile foundations: Construction of piles, pile load test, load capacity and settlement of piles, design of under reamed files; (individual pile & group of piles); Design of Pile foundation, use of relevant I.S. Code (I.S. 2911: Part I-IV); Well foundation: Types, element and construction well foundation, principles of design.
III	Earth pressure theory: Introduction to Coulomb's earth pressure theory for cohesive and granular soil, graphical methods. Classification of earth retaining structures (Rigid and Flexible). Analysis & Design of Sheet pile wall, bulk head anchored sheet pile (by free earth support method & fixed earth support method).
IV	Pile Foundations Classification and selection of piles – Static and dynamic formulae for single pile capacity – Efficiency and capacity of pile groups – Design of Pile group – Settlement of Pile Groups– Load test on piles
V	Introduction to soil dynamic: Definitions, spring mass system, single degree of freedom system, free and forced vibration of damped and undamped systems; Types & criteria for design of machine foundations. Analysis and design of block foundation; Vibration isolation (active and passive method).

Text/ Reference Books:

1. Soil Mechanics and Foundation by Punmia, Jain and Jain; Laxmi Publications (P) Ltd.
2. Engineering Properties of Soils by S K Gulati, Tata McGrawhill.
3. Dr.K.R.Arora (2001), Soil Mechanics and Foundation Engineering, Standard Publishers, Delhi – 110 006.
4. Donald P Coduto (2002), Geotechnical Engineering Principles and practices, Pearson Education Ltd.

DEPARTMENT OF CIVIL ENGINEERING

CONCRETE STRUCTURE-II

SUBJECT CODE: CE 603

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES
1. To impart the basic knowledge, skills and attitudes to analyze and design flat slab floor system;
2. To analyze and design retaining walls, counter-fort retaining walls and culverts
3. To designing water tanks; pre-stress concrete concepts

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	To know the analysis and design of slabs using yield line theory. To learn the technique for design of flat slabs
CO-2	Analysis and design of beam curved in plan, structural behavior of footings, column
CO-3	Design a water head tank as per I.S. code provision
CO-4	Design and analyze the earth retaining structures
CO-5	Analyze the pre-stress structure

CONCRETE STRUCTURE - II
(CE-603)

Unit	Topic
I	Nature of flat slabs, flat slabs with and without drops, co-efficient for design of flat slabs, reinforcement in flat slabs (IS code method), circular slab with various edges and loading conditions, design of circular slab.
II	Failure of beam under torsion, interaction between torsion and shear and between moment and torsion, concept of equivalent shear and moments. Analysis and design of beam curved in plan, structural behavior of footings, design of footing for walls and a single column combined and trapezoidal footing, design of strap footing.
III	Design criteria, material specifications and permissible stress for tanks, design of circular and rectangular tanks situated on the ground, underground under hoop stresses, design concept of overhead tanks.
IV	Structural behaviors of retaining wall stability of retaining wall against overturning, sliding, and pressure developed under the base design of T shaped retaining wall, concept of counter fort retaining wall, loads, forces, and I.R.C bridge loadings. Design of slabs under concentrated loads using effective with and piguead's method. Detailed design of R.C. slab culvert.
V	Advantages of pre-stressing, methods of pre-stressing, losses in pre-stress, analysis of simple pre-stressed rectangular and T- sections.

Text/ Reference Books:
1. Jain A.K. : Reinforced concrete design, limit state method.
2. S.Ramamrutham & R.Narayanan (2004), Design of reinforced concrete structures, Dhanpat Rai Publishing.
3. Varghese (2005), Advanced Reinforced Concrete Design, Prentice-Hall of India. Gurcharan Singh (2005),
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DEPARTMENT OF CIVIL ENGINEERING

TRANSPORTATION ENGINEERING-II

SUBJECT CODE: CE 604

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. To impart the basic knowledge, skills and attitudes of various systems of railway, airport and water transportation;

2. Understanding the components of railway tracks and designing of railway track, runway, taxiway etc.

3. Understanding the signaling systems for railway and air traffic control.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understanding the basic concept of railway alignment, sleeper, rail and ballast
CO-2	Design the track geometry, point and crossing
CO-3	Understanding the different type of track lying method and maintenance
CO-4	Design the runway, site selection and runway lighting
CO-5	Design the layout of harbor and port facilities

TRANSPORTATION ENGINEERING - II
SUBJECT CODE: CE-604

Unit	Topic
I	Indian railways, permanent ways planning of railway, capacity of railway track, cross-section sub grade, formation, embankment and cutting track drainage, track defects, rolling stock. Rail gauges: types of ails, defects in rails, rail failures, rail flaw detection, creep of rails, wear of rails. Rail fastening: Fish plates specks, chair keys, bearing plates. Sleeper: functions and types, concrete sleepers, manufacturing of concrete sleepers, sleeper density. Ballast: specifications and test on ballast, recommended, depth of blast.
II	Track geometry, gradient horizontal curve, super elevation and safe speed on curve, cant deficiency, negative super elevation and compensation for curvature on gradients, tractive power. Point and crossing: element of turnout, detail of a switch and crossing numbers and angles of crossings, design of a turnout, metro-Railways system, sub –urban system.
III	Plate lying: Train line telescopic and American method. Maintenance of track, signaling and interlocking, classifications of signals, methods of rain working: absolute block system, automatic block system, mechanical interlocking of a two line railway system. Yards and stations: site selection for railway station, layout of different types of yards, function of marshalling yards, underground railway and tunneling
IV	Aircraft characteristics, affecting airport planning, site selection and design, airport layout, runway orientation, wind rose system, estimation of runway length and corrections, airport geometric design and classifications, taxiways, runway pavement design, runway geometric design, design of overlay, runway lightening and marking, air traffic control, airport capacity, parking.
V	Harbors, layout and port facilities, break waters, jetties, wharves, navigation aids. Buoys and light houses: Island water transport.

Text/ Reference Books:

1. Khanna, S.K., Justo, C.E.G 'Highway Engineering' Nem Chand & Bros, 2017.
2. Kadiyalai, L.R., ' Traffic Engineering and Transport Planning', Publishers.
3. Partha Chakraborty, ' Principles Of Transportation Engineering, PHI

DEPARTMENT OF CIVIL ENGINEERING

ESTIMATION, EVALUATION AND COSTING

SUBJECT CODE: CE 605

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. To impart the basic knowledge, skills and attitudes of analyzing materials required for civil engineering works

2. To estimating the RCC works and steel works

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Evaluate and estimate the cost of expenditure and prepare a detailed rate analysis report.
CO-2	Analyze and assess the quantity of materials required for civil engineering works as per specifications
CO-3	Evaluate and estimate the RCC works and steel works
CO-4	Understand the contracts and tender documents in construction projects.
CO-5	Draw the Plan, front elevation and sectional elevation of a residential building with foundation details

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Khwaja Moinuddin Chishti Language University, Lucknow, U.P. (India)

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ESTIMATION, EVALUATION & CONSTRUCTION MANAGEMENT
SUBJECT CODE: CE 605

Unit	Topic
I	Analysis of Rates Rate analysis & preparation of bills – Data analysis of rates for various items of works – abstract estimates for Building projects.
II	Quantity Estimation for Building Estimation of building – Procedure of estimating, Types of estimates, detailed estimate of buildings including sanitary & electrical fittings
III	Quantity Estimation for Roads Estimate of R.C.C and Steel works - Scheduling - Slab - beam - column, Road – earthwork fully in banking, cutting, partly cutting & partly filling. Detailed estimate for WBM, Bituminous road.
IV	Valuation Valuation- rent fixation, tenders, - contracts –accounting procedure, measurement book, stores, cost & quality control – PWD & CPWD practice – Software Applications for Estimation of Buildings.
V	Fundamentals of drawing: Plan, front elevation and sectional elevation of a residential building with foundation details. Different type of stair case. Plan and section elevation of a Dog-legged stair-case.

Text/ Reference Books:
1. Estimating and Costing by B N Datta , S S Dutta and Co.
2. Estimating and Costing for Civil Engineering by G S Birdie.
3. Building Drawing by Shah, Kale and Patki .

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DEPARTMENT OF CIVIL ENGINEERING

EARTH AND EARTH RETAINING STRUCTURES

SUBJECT CODE: CE 606

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. To impart the basic knowledge, skills and attitudes of designing the earth retaining walls

2. To various ground improvement techniques; of analyzing the bearing capacity of soil.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Design and analysis of earth dam
CO-2	Different type of method for stabilized earth retaining walls
CO-3	Understanding the methods of soil nailing
CO-4	Understanding the basic concept of soil reinforcement technique
CO-5	Analysis of footing and bearing capacity of soil

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EARTH AND EARTH RETAINING STRUCTURES
SUBJECT CODE: CE 606

Unit	Topic
I	Earth and rock fill dam, choice of types, materials, foundation and requirement of safety of earth dam, seepage analysis.
II	Mechanically stabilized earth retaining walls, general considerations, Backfill and reinforced materials, construction details, stability reinforced earth wall: construction procedure, drainage.
III	Soil nailing: applications, advantages, limitations, methods of soil nailing, case histories.
IV	Reinforced soil: introduction, basic components, strength characteristics, soil reinforcement interface friction. Foundation on reinforced soil bed: pressure ratio.
V	Analysis of strip, isolated, rectangular, square footing on soil bed, ultimate bearing capacity of footing on reinforced earth slab, fiber reinforced soil.

Text/ Reference Books:
1. Soil mechanics and foundation engineering by VNS Murthy.
2. Reinforced Soil and its engineering applications by Swami Saran.
3. Analysis and design foundation by J.E. Bowles.

ENVIRONMENTAL ENGINEERING LAB -I
SUBJECT CODE: CE- 651

L-T-P: 0-0-2
Credit: 1

1. Determination of turbidity, color and conductivity.
2. Determination of pH, Alkalinity, and acidity.
3. Determination of hardness and chlorides
4. Determination of residual chlorine and chlorine demand
5. Determination of dissolved oxygen
6. Determination of most probable number of coliforms.

STRUCTURE DETAILING LAB-I
SUBJECT CODE: CE-652

L-T-P: 0-0-2
Credit: 1

1. Simple beam / lintels
2. T beam floor
3. Rectangular slabs
4. Brick wall and isolated footing
5. T shaped retaining wall
6. Combined rectangular and trapezoidal footing
7. Water tank.

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GEOTECHNICAL ENGINEERING LAB-I

SUBJECT CODE: CE- 653

L-T-P: 0-0-2

Credit: 1

1. Sieve analysis.
2. Hydrometer analysis
3. Liquid and plastic limit state
4. Shrinkage limit test
5. Relative density
6. CBR test
7. Cone penetration test
8. Core cutter test
9. In situ density
10. Permeability test.