



ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Kahilipara, Guwahati - 19

SYLLABUS

7th Semester, B Tech

Civil Engineering

7th Semester(Civil Engineering)

Sl. No.	Sub Code	Subject	L	T	P	Credit
Theory						
1	CE131701	Design of structure-III	3	2	0	4
2	CE131702	Environmental Engineering-II	3	2	0	4
3	CE131703	Geotechnical Engineering-II	3	2	0	4
4	CE131704	Quantity Survey & Estimation	3	0	0	3
5	CE1317EXX	Elective-1 (Departmental)	2	0	0	2
6	HS1317EXX	Elective-2 (Humanities)	2	0	0	2
Practical						
7	CE131711	Structural Design and Drawing Lab	0	0	2	1
8	CE131712	Environmental Engineering Lab-II	0	0	2	1
9	CE131714	Project-1	0	0	6	3
10	CE131721	Seminar on Summer Training	0	0	2	1
Total			16	6	12	25
Total Working Hours = 34						
Total Credits = 25						

DESIGN OF STRUCTURES - III
Subject Code-CE131701

L-T-P= 3-2-0
 Expected Weeks=12

Credit=4

Module	Topics	Hours
1	Prestressed concrete: Analysis of stress concept, concrete tendon placed at an eccentricity, tendon with parabolic profile, load balancing method. Losses of prestress,	10
2	R.C.C Design: Buildings:I.S. specifications for loadings, stair cases, Multi-bay multi storey frame, Flat slab. <i>Water Tank:</i> Circular and rectangular tanks, Intze type tank, column-brace type staging. Beams curved in plan, circular raft foundation.	10
3	Steel Design: Elevated steel water tank:Rectangular pressed steel tank, staging and footing. Plate girder and Gantry girder. <i>Tubular structures:</i> Behaviour of tubular sections, combined stresses, connections.	10
4	Industrial Buildings Loads, General arrangement and stability considerations, industrial building frames design	10
Total Hours		40

Structural Design and Drawing Lab (CE131711)

L-T-P= 3-2-0

Credit=4

Expected Weeks=12

<ul style="list-style-type: none">• Design and Drawing to be prepared for the following Cantilever and Counterfort type of Retaining Walls Circular and Rectangular Water Tanks resting on the ground Simple Portal Frame (Single bay and Single Storey) Connections: Bolted, Welded, Beam- Beam, Beam –Column, Seated, Stiffened and Unstiffened Columns: Splices, Column-Column of same and different sections Column Bases: Slab base and Gusseted base
<ul style="list-style-type: none">• Design and Drawing to be prepared for the following Roof Truss (Forces in the member to be given) Pressed Water Tanks

Recommended Books:

• Design of R.C.C structures;Dr N Subramanian Oxford University Press.
• Limit State Design of R.C.C Structures, A.K. Jain, Nemchand Brothers
• Design of RCC ,N.Krishnaraju , CBS Publishers
• Reinforced concrete design, S.U. Pillai and Devdas Menon Tata Mcgraw Hill
• Design of R.C.C structures; Ramamurtham; DhanpatRai Publishing Co

ENVIRONMENTAL ENGINEERING- II

Subject Code-CE131702

L-T-P= 3-2-0

Credit=4

Expected Weeks=12

Module	Topics	Hours
1	Sewage- Domestic and Storm water, Quantity, Sewage flow variations. Conveyance of sewage- Sewers, design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Storm Water Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, Characteristics of sewage: composition, chemistry of sanitary sewage, B.O.D., C.O.D., aerobic and anaerobic decomposition.	8
2	Sewage Disposal: discharge of raw and treated sewage on land and water, standards for disposal of raw and treated sewage on land and water, limits of dilution. Self purification of streams: oxygen economy, sewage farming. Sewage treatment: aims, methods of treatment and various flow-sheets for preliminary, primary, secondary and tertiary treatment, screens, grit chambers, primary and secondary clarifiers, disposal of screenings and grit. Biological treatment methods; principles, trickling filter operation, re-circulation, activated sludge process , sludge volume index, stabilization ponds.	8
3	Sludge digestion: principles of anaerobic digestion, quantity and characterizations of sludge, design of sludge digestion tanks, disposal of digested sludge, drying beds.	6
4	Low cost sanitation: septic tanks and Anaerobic Filter - principles, operation and suitability, design values, disposal of treated effluent.	6
5	Tertiary Treatment methods – general description.	5
6	Building Plumbing- Introduction to various types of home	6

	plumbing systems for water supply and waste water disposal, high rise building plumbing, Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and fittings used.	
Total Hours		40

Environmental Engineering Lab-II (CE131712)

L-T-P= 0-0-2

Credit=1

Expected Weeks=12

• Jar test
• Dissolved oxygen
• Chemical oxygen demand (COD)
• Biochemical oxygen demand (BOD)
• Most probable number (MPN)

Recommended Books:

• Water Supply and Sanitary Engineering , S.K.Hussain
• Manual on Sewerage and Sewage Treatment and Manual on Water Supply and Treatment, Ministry of Works
• CPHEEO Manual on Water supply and treatment
• CPHEEO Manual on Sewerage and sewage treatment
• Water Supply Engineering., Dr.B.C.Punmia, Ashok Kumar Jain,Arun Kumar Jain; Laxmi Publications (P) Ltd.
• Metcalf& Eddy, Wastewater Engineering- Treatment and Reuse (Revised by G.Tchobanoglous, F. L. Burton and H. D. Stensel), Tata McGraw Hill, 4 th Edn., 2004.

GEOTECHNICAL ENGINEERING - II (CE131703)

L-T-P= 3-2-0

Credit=4

Expected Weeks=12

Module No	Topic	Hours
1	Lateral earth pressure: Active and passive states, earth pressure at rest, effect of wall movement of earth pressure, Rankine's theory & Coulomb's theory of earth pressure for cohesive and cohesionless soils, Culmann's Graphical method.	6
2	Shallow foundations : General requirements of foundation, location and depth of foundation, important terms regarding bearing capacity, Terzaghi's theory, Meyerhof's theory, Effect of water table and eccentricity on bearing capacity, computation of bearing capacity by IS code method, determination of allowable bearing pressure, settlement of shallow foundations, corrections to settlement due to consolidation, Plate load test (IS 1888-1982).	8
3	Stress distribution: Boussinesq equations , vertical stress distribution diagrams, Newmark's influence chart, Equivalent point load method, Westergaard's equation, contact pressure.	4
4	Pile foundation: Load carrying capacity of piles, Static pile load formulae, Dynamic pile formulae, Group action of piles, negative skin friction, Pile load test (Initial, Pull-out).	5
5	Well Foundation: Types of wells, components of a well foundation, Depth of a well foundation.	3
6	Machine foundation: Types of machine foundation, important terms related to machine foundation, design criteria, Degrees of freedom of a block foundation.	4
7	Soil exploration: Methods of soil exploration, methods of boring, soil samplers and sampling, depth of exploration, standard penetration test, static cone penetration test, borehole log.	4
8	Ground improvement techniques: Removal & replacement, precompression, vertical sand drains, dynamic compaction, vibroflotation, stone columns, soil grouting, blast densification, soil nailing, micropiles, definition and functions of geotextiles.	6
	Total	40

Books for references:

- 1) Basic and applied soil mechanics-Gopal Ranjan & A.S.R Rao
- 2) Soil Mechanics and Foundation-Dr. B.C Punmia, Ashok Kumar Jain, Arun Kumar Jain
- 3) Foundation Analysis and Design-J.E BOWLES, McGraw Hills Education(India) Pvt. Ltd.

QUANTITY SURVEYING & ESTIMATION(CE131704)

L-T-P= 3-0-0

Credit=3

Expected Weeks=12

Module No	Topic	Hours
1	Types of estimate: Preliminary, detailed, supplementary, revised. Measurements – items (lump sum, rate only, detail), units, tools, equipments, accuracy limits. Calculation of quantities – linear (1D), 2D, volumetric (3D), weight. Rate Analyses. Abstract of cost – Building Works (excavation, filling, treatments, shuttering, reinforcements, concrete - foundation, slab, beam, column, lintel, chajja, etc, brickwork – walls, arches, plinth, etc, wood work- frames, doors, windows, cabinets, etc, glasswork – doors, windows, etc metal work, stonework, plumbing, electrification, sewerage, paint etc); Road Works (Earthwork - soft & hard strata, layer works, surfacing, marking, railings, kerbstonesetc), Bridges, Culverts, Water tanks (rectangular, circular), Septic tanks.	20
2	Sanction: Bills of Quantities, Administrative approval, expenditure sanction, technical sanction.	4
3	Specification: General and detailed specification, Use of IS and IRC codes and special publications, building by-laws, different manuals, handbooks and guidelines.	2
4	DPR: Project survey and collection of technical and design data, preparation of DPR RFP: Introduction to TOR, Special provisions, Contract conditions	2
5	Rules & regulation for execution: Different types of tender (Lump sum, PPP, Performance based etc), NIT, Security Deposits (earnest money, tender bond, insurance), tendering procedure (single/ double envelope system), tender evaluation (criteria, comparative statement) and award, Introduction to PWD accounts and procedure for works.	12
	Total	40

Reference:

Book Author Publisher

1. Masonry and timber structures including earthquake resistant Design by Arya, A.S Nemchand & brothers.
2. Estimating and costing in civil engineering-Theory & Practice by B. N. Dutta, UBS publishers
3. Different IRC and IS codes, IRC-37, IRC-86, IS 456
4. Estimation and Costing by Chakravarty

Elective-1(Departmental)

ADVANCED ENGINEERING GEOSCIENCES

Sub Code : CE1317EXX(Elective 1)

L-T-P= 2-0-0

Credit=2

Expected Weeks=12

MODULE	TOPIC	HOURS
1. Formation of Soil	Weathering of rocks – types, controlling factors, stages	03
	Geomorphological processes, rock cycle	02
	Soil profile	02
2. Soil Mineralogy	Crystalline & Non-crystalline clay minerals, Non-clay minerals, Kaolinite, Illite and Montmorillonite	02
	Process of formation of clay minerals	02
	Engineering properties of clay minerals	02
	Soil Fabric and its types	02
	Influence of soil structure, soil fabric and volume change on properties of soil	02
	Diffused double layer theory	01
	Cation exchange Capacity	01
	Complexity of soil nature.	02
3. Soil Deposits	Types of soil and soil deposits	02
	Soil deposits of India with special emphasis on the Northeast India	02
4. Soil Erosion	Definition, Types	02
	Prevention and Control	02
5. Rock Mechanics	Engineering properties of rocks	02
	Defects in rock masses	03
	Engineering classification of Rocks	02
	Rock Quality Designation, Core Recovery, Modified Core recovery, Numerical Problems on Core log.	02
	Improvement in properties of rock mass – Grouting, Guniting, Bolting.	02
TOTAL HOURS		40

Textbook

- Rock Mechanics by B.P. Verma
- Fundamentals of Soil Mechanics by J. Mitchell

OPEN CHANNEL FLOW

Subject Code-CE1317EXX

L-T-P= 2-0-0

Credit=2

Expected Weeks=12

Module	Topics	Hours
1	Open Channel Flow: <ul style="list-style-type: none">• Kinds of open channel flow, channel geometry, types and regimes of flow• Velocity distribution in open channel, wide open channel, specific energy, critical flow and its computation• Energy in non-prismatic channel, momentum in open channel flow, specific force.	6
2	Uniform flow in rigid – boundary channels: <ul style="list-style-type: none">• Qualification of uniform flow, velocity measurement, Manning's and Chezy's formula, determination of roughness coefficients & Boundary shear stress.• Determination of normal depth and velocity, most economical sections, channel conveyance, section factor – curves for rectangular and trapezoidal channels, flow in a circular channel, relation between conveyance and depth.• Flow in a channel section with composite roughness.	8
3	Design of channels: <ul style="list-style-type: none">• Rigid – boundary channels, non-scouring erodible boundary channels, alluvial channels, free board in channels.	3
4	Energy Depth Relationship: <ul style="list-style-type: none">• Specific energy, critical depth, specific energy curve, critical depth computation, control section, application of specific energy and critical depth concepts. Channel transitions.	5

5	Gradually Varied flow: <ul style="list-style-type: none"> Governing equation and its limitations, water surface profiles – classification and characteristics; Dynamic equations of gradually varied flow, assumptions and characteristics of flow profiles, classification of flow profile, draw down and back water curves Profile determination, graphical integration, direct step and standard step method, numerical methods, flow through transitions, dynamic equation of spatially varied flow 	8
6	Hydraulic jump: <ul style="list-style-type: none"> Types of jump, hydraulic jump in horizontal and sloping rectangular channels, location and length of jump on horizontal floor, forced hydraulic jump, jump in expanding rectangular channels. Energy loss and application of hydraulic jump. 	5
7	Channel control and transitions : <ul style="list-style-type: none"> Free overfall, sharp crested weirs, flow over spillways, broad – crested weirs, side weirs, sluice gate, standing wave flume, subcritical flow transitions, supercritical flow transitions, flow in bends. 	2
8	Unsteady flow: <ul style="list-style-type: none"> Waves and their classification, celerity of a wave, surges, equations of motion, Introduction to Dam Break Flood, method of characteristics and finite difference. 	3
Total Hours		40

Recommended Books:

• <i>Flow through open channel – Rajesh Srivastava, Oxford higher education publication</i>
• <i>Flow through open channels- K. Subramanya, Mac Graw Hill Publication</i>
• <i>Open channel flow – Madan Mohan Das, Easter economy edition publication</i>
• <i>Open channel flow- Hubert Chanson</i>

Elective-2(Humanities)

PRESTRESSED CONCRETE

Subject Code: HS1317EXX

L-T-P= 2-0-0

Credit=2

Expected Weeks=12

Module	Topics	Hours
1	PRESTRESSED CONCRETE: Introduction, Prestressed systems, Pre-tensioned and post tensioned members, Analysis, Losses in Prestressed concrete, Pressure line, Load balancing concept, Factors influencing deflection, Analysis and design of statically determinate prestressed concrete structure for flexure and shear, Statically indeterminate beams.	8
2	ELEMENTS OF PRESTRESSED CONCRETE: Analysis of stress concept, concrete tendon placed at an eccentricity, tendon with parabolic profile, load balancing method. Losses of prestress, I.S. specifications analysis and design of prestressed concrete beams – rectangular, I – section, T – section for flexure and shear, Design of end block	8
3	DESIGN OF PRESTRESSED CONCRETE STRUCTURES: Design of flexural members, Design for Shear, bond and torsion. Design of End blocks and their importance.	10
4	CONTINUOUS BEAMS: Application of prestressing in continuous beams, concept of linear transformation, concordant cable profile and cap cables.	6
5	DESIGN OF SPECIAL STRUCTURES: Special structures like prestressed folded plates, prestressed cylindrical shells, prestressed concrete poles.	8
Total Hours		40

Recommended Books:

• <i>Prestressed Concrete by Krishna Raju, Tata McGraw Hill Publishing Co. 2nd Edition, 1988.</i>
• <i>Fundamentals of Prestressed Concrete by N.C.Sinha&S.K.RoyS.Chand& Co., 1985.</i>
• <i>T.Y.Lin, Design of Prestressed Concrete Structures, John Wiley and Sons, Inc 1960.</i>
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FLOOD MANAGEMENT AND RIVER ENGINEERING

SUB CODE: HS1317EXX.

L-T-P= 2-0-0

Credit=2

Expected Weeks=12

Module	Topics	Hours
	First half: Flood control	
1	Introduction: <ul style="list-style-type: none">• Definition, causes and effects of flood;• Incidence and extent of floods with special reference to North East region, flood damages, Dam break or Embankment breaching Flood in North East.	2
2	Flood estimation: <ul style="list-style-type: none">• Rational, empirical and unit hydrograph methods; design flood, flood frequency analysis – annual series and partial duration series, probability and return period of flood, Gumbel and Log pearson distributions, flood frequency at points without stream flow records, design flood selection criteria, design storm, probable maximum flood.• Frequency series, recurrence interval, statistical methods for estimating the frequency of rare events.	8
3	Flood management: <ul style="list-style-type: none">• Flood damage mitigation, reduction of peak flood – reservoirs and detention basin; confinement of flow embankment, flood walls, ring bunds; reduction of peak stage – channel improvement, cut – off.• Diversion of flood water – emergency flood ways, river diversion, inter basin transfer; flood abutment – watershed management measures,• Weather modification; flood plain management land use regulations, flood plain zoning, flood proofing, flood insurance; emergency measures. Second Half: River Engineering	8
4	Introduction: <ul style="list-style-type: none">• River course – upper, middle and delta reaches; Himalayan and Peninsular rivers, principal river systems of India	3

5	Types of rivers: <ul style="list-style-type: none"> Perennial, flushy and virgin rivers; incised, boulder, flood plain, delta and tidal rivers; aggrading, degrading, meandering and braided rivers. 	3
6	Sediment transport: <ul style="list-style-type: none"> Sediments – bed load, suspended load and wash load; riverbank erosion, incipient motion, mode of sediment transport – rolling, sliding, saltation and suspension; introduction to theories of sediment transport including Shield's Theory. 	8
7	Regimes of flow: <ul style="list-style-type: none"> Definition, description of regimes of flow: plane bed, ripples, dunes, transition and anti dunes; prediction of regimes of flow. 	2
8	River behaviour: <ul style="list-style-type: none"> Behaviour of rivers in straight reaches and bends, meandering – causes and general features, factors effecting meanderings, cut – off – development and effects, causes of braiding and delta formation. 	3
9	River training: <ul style="list-style-type: none"> Definition, objectives, classification – high water, low water and mean water river training; River training works – marginal embankment, spurs, guide bank, porcupines, bank pitching and revetment, cut off, pitched island, sills and bottom paneling, bundling and river training works in Assam. 	3
Total Hours		40

Recommended Books:

• <i>Irrigation Engineering and hydraulic structures- S.K. Garg, Khanna Publishers</i>
• <i>Elements of water resources engineering- K.N. Duggal, J.P. Soni, New Age International Publications.</i>
• <i>Irrigation Engineering and water power engineering- Dr. B.C Punmia & Dr. Pande B.B. Lal, Laxmi Publications</i>

Project-I (CE131714)

L-T-P= 0-0-6
Expected Weeks=12

Credit=3

Guidelines will be issued by the University from time to time.

Seminar on Summer Training (CE131721)

L-T-P= 0-0-2
Expected Weeks=12

Credit=1

Guidelines will be issued by the University from time to time.