



ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY
Guwahati
Course Structure and Syllabus

(From Academic Session 2018-19 onwards)

B.TECH
CIVIL ENGINEERING

3rd SEMESTER



ASSAM SCIENCE AND TECHNOLOGY UNIVERSITY

Course Structure

(From Academic Session 2018-19 onwards)

B.Tech 3rd Semester: Civil Engineering

Semester III/B.TECH/CE

Sl. No.	Sub-Code	Subject	Hours per Week			Credit C	Marks	
			L	T	P		CE	ESE
Theory								
1	MA181301A	Mathematics III-A (for branches other than CSE and ECE/ETE)	2	1	0	3	30	70
2	CE181302	Solid Mechanics	2	1	0	3	30	70
3	CE181303	Fluid Mechanics	3	1	0	4	30	70
4	CE181304	Building Construction and Planning	3	0	0	3	30	70
5	CE181305	Engineering Survey-I	3	1	0	4	30	70
6	CE181307	Structural Analysis-I	3	1	0	4	30	70
7	MC181306	Constitution of India	2	0	0	0 (PP/NP)	-	100
Practical								
1	CE181318	Civil Engineering Drawing and CAD Lab	0	0	2	1	15	35
2	SI181321	Internship-I (SAI - Social)	0	0	0	1	-	100
TOTAL			18	5	2	23	195	655
Total Contact Hours per week : 25								
Total Credits: 23								

N.B. MC181306 is a Mandatory Audit Course (No Credit). It will be evaluated as PP (Pass) or NP (Not Pass)

Detailed Syllabus:

Course Code	Course Title	Hours per week L-T-P	Credit C
MA181301A	Mathematics III-A (for branches other than CSE and ECE/ETE)	2-1-0	3

MODULE 1: Partial Differential Equation: (15 Hours)

Formation of Partial Differential equations, Linear partial differential equation of first order, Non-linear partial differential equations of first order, Charpit's method, Method of separation of variables, boundary value problem with reference to the one dimensional heat and wave equation.

MODULE 2: Probability Theory: (15 Hours)

Review of basic probability and Bayes' theorem, Probability distribution, Binomial, Poisson and normal distribution, Joint distribution, Test of significance, fitting of straight line by least square method, Elementary concept of Markov Chain.

MODULE 3: Laplace Transform: (10 Hours)

Laplace transform of elementary function, Properties of Laplace transform, inverse Laplace transform, convolution theorem, Solution of ordinary differential equations with the help of Laplace transform.

Textbooks/References:

1. Advanced Engineering Mathematics: Erwin Kreyszig
2. Higher Engineering Mathematics: B V Ramana
3. Theory and problems of Probability: Seymour Lipschutz
4. A text book of engineering Mathematics: N. P. Bali & M. Goel
5. Statistical Methods: An Introductory Text- J.Medhi, New Age International Publishers

Course Code	Course Title	Hours per week L-T-P	Credit C
CE181302	Solid Mechanics	2-1-0	3

MODULE 1: Simple Stress and Strain

Simple stress and strain: Tensile, compressive and shear stress, principal stresses and strains; Mohr's circle for plane stress and plane strain Hook's law. Young's modulus, Poisson's ratio, elastic constants and their relationship.

Hook's law; Stress-strain diagrams for brittle and ductile materials

Generalized stress and strain: Analysis of plane stress and plane strain, Mohr's circle of stress and strain.

MODULE 2: Bending Stress and Shear Stress in Beam

Theory of Simple Bending - Bending stresses in beams.

Shear stress distribution in various shapes of cross section of beams.

MODULE 3: Columns

Empirical formula, Rankine's formula, slenderness ratio, Concentric and eccentric load. Columns with initial curvature. Equivalent eccentricity, Beam column.

MODULE 4: Thin Cylinders and Shells

Hoop stress, Thin Cylinders and Shells under internal fluid pressure – Riveted Joint Connection - Wire wound thin cylinders.

MODULE 5: Torsion of Circular Shafts

Theory of Pure Torsion in Solid and Hollow circular shafts - Torsional Shear Stresses - transmission of Power- Strength of shaft or torsional rigidity.

Text Books/References:

1. R. Subramanian- Strength of Materials, Oxford
2. Debabrata Nag and Abhijit Chanda, Strength of materials, Wiley-India Publishers,2012.
3. S Ramamrutham, Strength of Materials, Dhanpat Rai Publishing Company.
4. Timoshenko and Gere, Mechanics of Materials, CBS Publishers, New Delhi, 1996.
5. S.B. Junarkar and H.J. Shah, Mechanics of Structures, Charotar Publishers, Anand, 1998.
6. Beer and Johnston, Mechanics of Materials, McGraw Hill International Edition, 1995.
7. E.P. Popov, Engineering Mechanics of Solids, Prentice Hall of India Pvt. Ltd., 1998.

Course Code	Course Title	Hours per week L-T-P	Credit C
CE181303	Fluid Mechanics	3-1-0	4

MODULE 1: Fluid Properties:

Fluid- definition, types; physical properties of fluid- density, specific weight, specific volume, specific gravity, viscosity- Newton's law of viscosity, surface tension, compressibility of fluids, capillarity.

MODULE 2: Fluid Statics:

Hydrostatic pressure, pressure height relationship, absolute and gauge pressure, measurement of pressure- manometer; pressure on submerged plane and curved surfaces, centre of pressure; buoyancy, equilibrium of floating bodies, metacentre; fluid mass subjected to accelerations.

MODULE 3: Fluid Kinematics:

Types of motion- steady and unsteady flow, uniform and non uniform flow, laminar and turbulent flow, compressible and incompressible flow, one, two & three dimensional flow; stream lines, streak lines and path lines, stream tube, stream function and velocity potential, flow net and its drawing; free and forced vortex.

MODULE 4: Fluid Dynamics:

Basic equations- continuity equation, energy equation (Euler's equation, Bernoulli's equation), momentum equation; application of energy equation and continuity equation- Venturimeter, orifice meter, pitot tube.

MODULE 5: Orifices and Mouthpieces:

Classification of orifice, flow through orifice, hydraulic coefficients- definition and experimental determination, discharge through large rectangular orifice, time of emptying a tank (for both rectangular and hemispherical) through an orifice at its bottom; classification of mouthpiece, flow through an external cylindrical mouthpiece, flow through a convergent- divergent mouthpiece, mouthpiece running full and running free.

MODULE 6: Notches and Weirs:

Types- rectangular, triangular and trapezoidal notches and weirs, suppressed weir, Cipolletti weir, submerged weir, narrow and broad crested weir, Francis's formula with end contraction.

MODULE 7: Flow through Pipes:

Loss of head due to friction, Darcy Weisbach formula; minor head losses; flow through compound pipes; siphon.

MODULE 8: Dimensional Analysis and Model Laws:

Dimensional analysis- Rayleigh's method, Buckingham's pi-theorem; important dimensionless parameters and their significance; application of dimensional analysis to fluid flow problems: geometric, kinematic and dynamic similarities; scale ratio, prototype, distorted model.

Text Books/References:

1. Hydraulics and Fluid Mechanics (Including Hydraulic Machines)- by P. N. Modi and S. M. Seth
2. Hydraulics Fluid Mechanics and Fluid Machines- by S. Ramamrutham

3. A Textbook of Fluid Mechanics and Hydraulic Machines- by R. K. Bansal
4. Fluid Mechanics and Machinery- by C. S. P. Ojha, R. Berndtsson and P. N. Chandramouli
5. Fluid Mechanics- by Frank M. White
6. Fluid Mechanics and Turbomachines- by Madan Mohan Das
7. Fluid Mechanics- by A. K. Jain
8. Fluid Mechanics through Problems- by R. J. Garde
9. Theory and Application of Fluid Mechanics- by K. Subramanya

Course Code	Course Title	Hours per week L-T-P	Credit C
CE181304	Building Construction and Planning	3-0-0	3

1st PART: BUILDING CONSTRUCTION

MODULE 1: Introduction

Functional Requirements of a Building- Strength, Stability, Comforts, Convenience, Daylight, Ventilation

Types of Building: R.C.C and Assam Type; Classification as Per National Building Code of India (2005)

MODULE 2: Building Elements

Foundation and Plinth- Deep and shallow foundation

Wall, Beam, Column, Lintel.

Damp proofing: Causes of dampness, method and materials of damp proofing, damp proofing treatment in buildings, damp proofing for roofs.

Roof and roof coverings: Classification, Material- false ceiling

Shoring, scaffolding and formwork

MODULE 3: Circulation elements

Horizontal and Vertical transportation in Buildings

Stairs: Definition – classification of stairs- location of stairs – fixation of rise and trade– thumb rule – – stair of different materials – lift and escalators.

Doors and windows: Location of doors and windows, size, types of doors and windows, fixing and fastenings.

MODULE 4: Brick masonry

Definition, General principle, Bonds in brick work, Merits and demerits, Defects in brick masonry, Reinforced brick work.

MODULE 5: Flooring and Finishing

Types of flooring- Mud flooring, brick flooring, cement concrete flooring, tile flooring, mosaic flooring, marble flooring, timber flooring.

Plastering and painting: Cement and lime terracing, painting and varnishing

2nd PART: BUILDING PLANNING

MODULE 1: General principles of planning

Introduction: History of Urbanisation and Urban Development, need for Building Planning, Development Control, Zoning Regulation

Principles of building planning: Aspect, Prospect, Privacy–. Orientation, Ventilation, Lighting, sanitary planning of buildings.

MODULE 2: Building Bye-Laws

Objectives of building byelaws, Provisions of National Building Code of India for Building Planning, Different terms, Building By-Laws for Residential and Commercial Buildings, set-back lines, open spaces, carpet area, Floor area Ratio (FAR) and Floor Space Index (FSI), Building height limitations, minimum sizes of different rooms etc.

Procedure for obtaining Permission for Construction, Site selection and site plan.

Principle of Vastu Shastra, Concept of Green buildings- LEED and GRIHA provisions.

MODULE 3: Building services

Water supply, Sewerage and drainage services.

Electrical Services.

Fire and Safety Services.

Heating, ventilation and air conditioning services.

Text Books/References:

1. “Building Construction”- B.C. Punmia, Laxmi Publications (P) Ltd.
2. GMDA Building Byelaw
3. GMDA Master Plan
4. National Building Code of India (2005), BIS
5. “Building Construction”, P.C. Vargesse, Practice hall of India, New Delhi
6. “Civil Engineering Drawing”– Malik & Meo, Computech Publication Ltd.
7. :Building Planning, Designing & Scheduling”– Gurcharan Singh / Jagdish Singh, Standard Publications,
8. “Alternative Building Materials and Technologies” by Jagdish, Reddy and Rao, New Age International (P) ltd.

Course Code	Course Title	Hours per week L-T-P	Credit C
CE181305	Engineering Survey-I	3-1-0	4

MODULE 1: Introduction

Definition, Classification of survey, General principles, Basic terms, Use of survey.

MODULE 2: Chain Surveying

Linear measurement-chain and tape, Instruments for chaining, ranging out survey line, Different methods, Errors in chaining, Tape corrections, Locating ground features, Field book.

MODULE 3: Compass Surveying

Introduction, Angular measurement using compass, Bearing & meridian-types, Classification of compass, Traversing with compass, Measurement and numerical problems, Magnetic declination, Errors in compass survey, Adjustments of closing errors.

MODULE 4: Levelling

Introduction to Leveling, Definition of basic terms, Level Book, entries, observation and reduction of Levels. Numerical problems. Classification- Profile & Cross-section, Fly Leveling, Reciprocal Leveling, Errors in Leveling and accuracy, Curvature and refraction, Trigonometrical levelling - Introduction, base of objects accessible and inaccessible, difference of elevation.

MODULE 5: Plane Table Surveying

Equipment & accessories, working operations, Methods of plane tabling- radiation, intersection, traversing and resection, Advantages and disadvantages of plane table surveying.

MODULE 6: Theodolite Surveying

Measurement of horizontal angle- method of repetition and reiteration, Various types of theodolites, traversing by Theodolite- closed traverse, plotting traverse, closing error, balancing a traverse, Computation of independent Coordinates-Gale's Traverse Table.

MODULE 7: Contouring

Definition, Characteristics of contours, Direct and indirect methods of contouring, Use of contour maps

MODULE 8: Tacheometric surveying

Basic systems of Tacheometric measurement, Methods of tachometry, Fixed hair method, anallactic lens, subtense method, tangential method. Derivation of formulae and numerical problems.

MODULE 9: Computation of area and volume

Units and conversion factor, area bounded by irregular boundaries- Mid ordinate rule, average ordinate rule, trapezoidal rule, simpson's rule, Formulae for circulation of Cross-Sectional Area, Formulae for calculation of volume. Numerical problems.

Text Books/References:

1. Surveying Vol I, II: Punmia, Jain & Jain, Laxmi publications, 2016
2. Surveying Vol I, II: S.K. Duggal, McGraw-Hill Education Pvt. Ltd., 2013
3. Surveying and Leveling – R. Subramanian, Oxford University Press, 2015
4. Surveying & Leveling – N N Basak, McGraw-Hill Education Pvt. Ltd., 2014

Course Code	Course Title	Hours per week L-T-P	Credit C
CE181307	Structural Analysis-I	3-1-0	4

MODULE 1: Structural Systems

Introduction to analysis of truss, moment of inertia.

Introduction, Forms of Structure, Load Path, Linear and Non-linear structure, Introduction to Indeterminate Structures, Static and Kinematic Indeterminacy.

MODULE 2: Shear Force and Bending Moment

Introduction to shear force and bending moment, Applications to simply supported beam, cantilever beam and overhanging beam for different loading conditions like Point load, uniformly distributed load, uniformly varying load. The loading diagrams from bending moments diagrams.

MODULE 3: Deflection in Beams

Computation of slope and deflection in Simply supported and cantilever beams by double integration, Moment Area method, Macaulay's method, Conjugate beam method, Applications to simply supported, overhang and cantilever beams.

MODULE 4: Work and Energy Principle

Strain Energy Expression, Castigliano's First theorems and their applications to find deflection and redundant forces in simple cases. Principle of virtual work, Maxwell's Reciprocal Theorem, Maxwell-Betti's Theorem, Unit load method.

Statically indeterminate structure, Castigliano's 2nd theorem, Analysis of Redundant truss, Analysis of Frames with redundant members.

MODULE 5: Arch Structure

3 Hinged Arches, Normal thrust, Radial Shear, Horizontal Reactions, Temperature effect on Arch, two hinged arch - Circular and Parabolic, Horizontal Reactions, Normal Thrust, Radial Shear, Yielding of support.

MODULE 6: Cable Structure

Analysis of Cable Structure, Reactions on Piers, Length of Cable, Analysis of two hinged and three hinged stiffening girder.

Text Books/References:

1. Structural Analysis: T S Thandavamoorthy, Oxford University Press
2. Basic Structural Analysis- C S Reddy, McGraw Hill Education (India) Private Limited, New Delhi
3. Theory of Structure- S Ramamrutham, Dhanpat Rai Publishing Company, New Delhi
4. Theory of Structure- B C Punmia, Laxmi Publications (P) Ltd.
5. Intermediate Structural Analysis –Wang C.K., Tata Mc Graw Hill Publishers, 2010.
6. Theory and Problems of Strength of materials- Nash, William A. Tata McGraw Hill, New Delhi

Course Code	Course Title	Hours per week L-T-P	Credit C
MC181306	Constitution of India	2-0-0	0 (PP/NP)

Course Objectives: Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes: Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

MODULE 1: History of Making of the Indian Constitution:

- a) History
- b) Drafting Committee, (Composition & Working)

MODULE 2: Philosophy of the Indian Constitution:

- a) Preamble
- b) Salient Features

MODULE 3: Contours of Constitutional Rights & Duties:

- a) Fundamental Rights
- b) Right to Equality
- c) Right to Freedom
- d) Right against Exploitation
- e) Right to Freedom of Religion
- f) Cultural and Educational Rights
- g) Right to Constitutional Remedies □ Directive Principles of State Policy □ Fundamental Duties.

MODULE 4: Organs of Governance:

- a) Parliament
- b) Composition

- c) Qualifications and Disqualifications
- d) Powers and Functions
- e) Executive
- f) President
- g) Governor
- h) Council of Ministers
- i) Judiciary, Appointment and Transfer of Judges, Qualifications
- j) Powers and Functions

MODULE 5: Local Administration:

- a) District's Administration head: Role and Importance,
- b) Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation.
- c) Pachayati raj: Introduction, PRI: Zila Pachayat.
- d) Elected officials and their roles, CEO Zila Pachayat: Position and role.
- e) Block level: Organizational Hierarchy (Different departments),
- f) Village level: Role of Elected and Appointed officials,
- g) Importance of grass root democracy

MODULE 6: Election Commission:

- a) Election Commission: Role and Functioning.
- b) Chief Election Commissioner and Election Commissioners.
- c) State Election Commission: Role and Functioning.
- d) Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books/References:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

Course Code	Course Title	Hours per week L-T-P	Credit C
CE181318	Civil Engineering Drawing and CAD Lab	0-0-2	1

Doors and Windows

Glazed and panelled doors of standard sizes; Glazed and panelled windows of standard sizes

Stairs

Proportioning and design of dog-legged and open well RCC stair case for an office / Residential building

Foundations

Spread foundation for walls and columns; Footing for an RCC column, raft and pile foundations

Roofs and Trusses

Types of sloping roof, King post and Queen post trusses

Functional Design of Buildings

To draw the line diagram, plan, elevation and section of residential buildings (flat, pitched roof) with schedule of openings

Computer Aided Designing

Prepare blue print of a two-storey residential building in AutoCAD
