TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

4-Year Bachelor of Technology (B.Tech) Curriculum and Syllabus for Civil Engineering (CE)

Fifth Semester

A. THEORY

Sl No.	Code Number	Subject	Contact Hours L	T	P	Total	Credit Point
1	TIU-UCE-T301	Career Advancement & Skill Development #	3	0	0	3	3
2	TIU-UCE-T303	Analysis of Structures – II	3	1	0	4	4
3	TIU-UCE-T305	Geotechnical Engineering – II	3	1	0	4	4
4	TIU-UCE-T307	Transportation Engineering – I	3	1	0	4	4
5	TIU-UCE-T309	Design of R.C.C. Structures	3	1	0	4	4
6	TIU-UCE-T311	Concrete Technology	3	0	0	3	3
		Total Theory				22	22

B. PRACTICAL

7	TIU-UCE-L301	Soil Mechanics Lab	0	0	3	3	2
8	TIU-UCE-L303	Concrete Technology Lab – I	0	0	3	3	2
9	TIU-UCE-L305	Computer Application in Civil Engg. – I	0	0	2	2	1
		Total Practical				8	5

C. SESSIONAL

10	TIU-UCE-S301	Design & Detailing of R. C. C. Structures	0	0	3	3	2
11	TIU-UES-S399	Entrepreneurship Skill Development	0	0	0	0	2
		Total Sessional				3	4
Total of Semester						33	31

List of Departmental Career Advancement & Skill Development (CASD) Subjects

Fifth Semester

TIU-UCE-T301 - CASD (Advanced Surveying and Hydraulic Machines)

TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

Fifth Semester

CAREER ADVANCEMENT & SKILL DEVELOPMENT
(ADVANCED SURVEYING AND HYDRAULIC MACHINES)
TIU-UCE-T301

L-T-P: 3-0-0 **Credits: 3**

ADVANCED SURVEYING:

Field astronomy: Celestial sphere, Astronomical terms and definition, celestial co-ordinate systems, different time systems

Concept of global positioning system: Coordinate and time systems, Definition of global and local coordinate systems, Relationship between satellite and conventional geodetic systems **Photogrammetric Surveying:** Photogrammetric terms; Applications; Type of photographs; Perspective geometry of near vertical and tilted photographs, heights and tilt distortions; Flight planning.

HYDRAULIC MACHINES:

Hydraulic Turbine: Definition, Terminologies, Classification of Turbines, Working Principle of different types of turbines, Gross Head and Net Head, Efficiencies of Turbine, Specific Speed of different types of turbines, Velocity Triangles of different types of turbines, Numerical Problems, Pelton Wheel Turbine, General Layout of hydroelectric power Plant.

Pumps: Centrifugal Pumps, Performance characteristic graph- design flow rate, Working Principles of positive displacement pumps, Head of Centrifugal Pump, Efficiencies of a Centrifugal Pump. Reciprocating Pumps, Classification of reciprocating pumps, Working principle, Numerical Problems.
Water Hammer: Speed of pressure wave, Slow and rapid closure, Use of a Surge tank, Hydraulic Ram.

Offered to Civil Engineering Semester 5:

External Expert	External Expert	HOD	Dean	Vice Chancellor

TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

ANALYSIS OF STRUCTURES – II

TIU-UCE-T303

L-T-P: 3-1-0 **Credits: 4**

Approximate analysis of Multi bay Multistoried Portal frames: Cantilever method, Portal method. Substitute frame analysis. Method of Elastic Centre. Column analogy technique. Stiffness and flexibility methods: Matrix methods of structural analysis. Analysis of Suspension bridges, Influence line diagram for Three-hinged and Two-hinged stiffening girders. Influence line diagram for indeterminate structures: Muller Breslau principle. Plastic analysis of Structures: Beams and Portal frames. Model analysis and applications. Analysis of Space truss – Tension coefficient method.

Offered to Civil Engineering Semester 5:

External Expert	External Expert	HOD	Dean	Vice Chancellor

TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

GEOTECHNICAL ENGINEERING – II

TIU-UCE-T305

L-T-P: 3-1-0 **Credits: 4**

Shear strength of soil: Mohr-Coulomb theory, Determination of shear strength from laboratory and field tests.

Stability of earth slopes: finite and infinite slopes, stability analysis by Swedish method of slices; stability number; tension cracks.

Lateral earth pressure: earth pressure at rest, active and passive conditions; Rankine and coulomb's theory; Earth pressure on retaining walls.

Bearing capacity of soil: modes of failure; bearing capacity theories; factors affecting bearing capacity.

Subsurface exploration: methods of boring and sampling; different types of samplers; ground water observations.

Offered to Civil Engineering Semester 5:

External Expert	External Expert	HOD	Dean	Vice Chancellor

TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

TRANSPORTATION ENGINEERING – I

TIU-UCE-T307

L-T-P: 3-1-0 **Credits: 4**

Introduction to Highway Engineering: Scope of highway engineering; Jayakar Committee Report; saturation system; highway financing (pay as you go method and credit financing method) and highway economics (quantifiable and non-quantifiable benefits to highway users, cost of vehicle operation, annual cost method, and benefit-cost ratio method).

Highway Alignment:factors controlling alignment; engineering surveys for highway alignment and location.

Highway Geometric Design: Cross-sectional elements; design speed, passing and non-passing sight distances; PIEV theory, requirements and design principles of horizontal alignment including radius of curvature, super elevation, extra-widening, design of transition curves, curve resistance, set back distance, grade compensation and vertical alignment.

Pavement design: Evaluation of soil subgrade, sub-base, base and wearing courses; design factors for pavement thickness (including design wheel load and ESWL, strength of pavement materials and plate load tests, and effect of climatic variations) Group Index and CBR, IRC method of flexible pavement design; Westergaards analysis of wheel load stresses in rigid pavements; frictional stresses and warping stresses; IRC recommendations for design of rigid pavements; design of expansion and contraction joints. Benkelmen Beam Test, Fialure of flexible and rigid pavements.

Pavement construction Technique: Types of pavement; construction of earth roads, gravel roads, WBM, bitumen and cement concrete roads; joints in cement concrete pavements.

Traffic Engineering: Traffic characteristics, theory of traffic flow, intersection design, traffic sign and signal design, highway capacity

Road Materials and Testing: Soil, Stone Aggregate, Bitumen, Marshal Stability Test

Offered to Civil Engineering Semester 5:

External Expert	External Expert	HOD	Dean	Vice Chancellor

TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

DESIGN OF R.C.C. STRUCTURES

TIU-UCE-T309

L-T-P: 3-1-0 **Credits: 4**

Introduction: Principles of design of reinforced concrete members-Working stress, and Limit State method of design, Experimental design.

Working stress method of design: Basic concepts and IS code provisions (IS: 456 2000) for design against bending moment Balanced, under reinforced and over-reinforced rectangular sections; design of singly reinforced sections.

Limit state method of design: Basic concepts and IS code provisions (IS: 456 2000) for design against bending moment and shear forces; concepts of bond stress and development length.

Analysis, design and detailing of singly reinforced rectangular, 'T' and doubly reinforced beam sections by limit state method.

Design and detailing of slab panels as per IS code provisions. Design and detailing of continuous beams and slabs as per IS code provisions.

Design and detailing of dog-legged staircase as per IS code provisions.

Design and detailing of reinforced concrete short columns of rectangular and circular cross-sections under axial load. Design of short columns subjected to axial load with moments (uniaxial and biaxial bending) – using SP 16.

Shallow foundations: Types; Design and detailing of reinforced concrete isolated square and rectangular footing for columns as per IS code provisions by limit state method.

Offered to Civil Engineering Semester 5:

External Expert	External Expert	HOD	Dean	Vice Chancellor

TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

CONCRETE TECHNOLOGY

TIU-UCE-T311

L-T-P: 3-0-0 **Credits: 3**

Cement-manufacturing process. Physical and Chemical properties. Different types of cement and their uses. Codes of practices, Testing of cement: Physical and Chemical tests. Tests on fresh and hardened concrete. Chemical admixtures and Plasticizers. Durability of concrete. Mix design approaches. High Performance Concrete, Ready Mixed Concrete. Fibre Reinforced Concrete. Shotcrete. Pumped concrete. Fly ash concrete. Self-Compacting concrete. Polymer concrete etc. Grouting and grouting materials.

Offered to Civil Engineering Semester 5:

External Expert	External Expert	HOD	Dean	Vice Chancellor

TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

SOIL MECHANICS LAB

TIU-UCE-L301

L-T-P: 0-0-3 **Credits: 2**

1. Field identification of different types of soil as per Indian standards [collection of field samples and identifications without laboratory testing], determination of natural moisture content.
2. Determination of specific gravity of i) Cohesionless ii) Cohesive soil
3. Determination of Insitu density by core cutter method & sand replacement method.
4. Grain size distribution of cohesionless soil by sieving & fine-grained soil by hydrometer analysis.
5. Determination of Atterberg's limits (liquid limit, plastic limit & shrinkage limit).
6. Determination of co-efficient of permeability by constant head permeameter (coarse grained soil) & variable head permeameter (fine grained soil).
7. Determination of compaction characteristics of soil.
8. Determination of compressibility characteristics of soil by Oedometer test (co-efficient of consolidation & compression Index).
9. Determination of unconfined compressive strength of soil.
10. Determination of Shear parameter of soil by Direct shear test.
11. Determination of undrained shear strength of soil by Vane shear test.
12. Determination of shear parameter of soil by Triaxial test (UU).
13. Standard Penetration Test (by large groups in the field).

Offered to Civil Engineering Semester 5:

External Expert	External Expert	HOD	Dean	Vice Chancellor

TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

CONCRETE TECHNOLOGY LAB – I

TIU-UCE-L303

L-T-P: 0-0-3 **Credits: 2**

1. Tests on cement – specific gravity, fineness, sound ness, normal consistency, setting time, compressive strength on cement mortar cubes.
2. Tests on fine aggregate – specific gravity, bulking, sieve analysis, fineness modules, moisture content, bulk density and deleterious materials.
3. Tests on coarse aggregate - specific gravity, sieve analysis, fineness modulus, bulk density.

Offered to Civil Engineering Semester 5:

External Expert	External Expert	HOD	Dean	Vice Chancellor

TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

COMPUTER APPLICATION IN CIVIL ENGG. – I

TIU-UCE-L305

L-T-P: 0-0-2 **Credits: 1**

Course Introduction: Computers as Engineering Tools; Review of computer basics (Computer Arithmetic).

Excel Review: Excel Data Handling and Pivot Tables; Optimization (General); Minimization Problems; Excel Solver and Optimization

Advanced Excel routines in problem solving Optimization: VBA Basic; VBA and Macros

Basic programming principles

Offered to Civil Engineering Semester 5:

External Expert	External Expert	HOD	Dean	Vice Chancellor

TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

DESIGN & DETAILING OF R. C. C. STRUCTURES

TIU-UCE-S301

L-T-P: 0-0-3 **Credits: 2**

General considerations: Design principle of R.C.C. sections. Limit state method of design Loads and stresses to be considered in the design as per I.S. code provision.

Design & detailing of a i) simply supported R.C.C Beam ii) Continuous T- Beam.

Design & Detailing of columns, isolated and combined footing

Design & detailing of a i) simply supported one way slab ii) One way Continuous slab.

Design of different units: Slab, beam column, roofing and staircase from floor plan of a multistoried frame building, typical detailing of a two-way floor slab.

Offered to Civil Engineering Semester 5:

External Expert	External Expert	HOD	Dean	Vice Chancellor