Course Curriculum

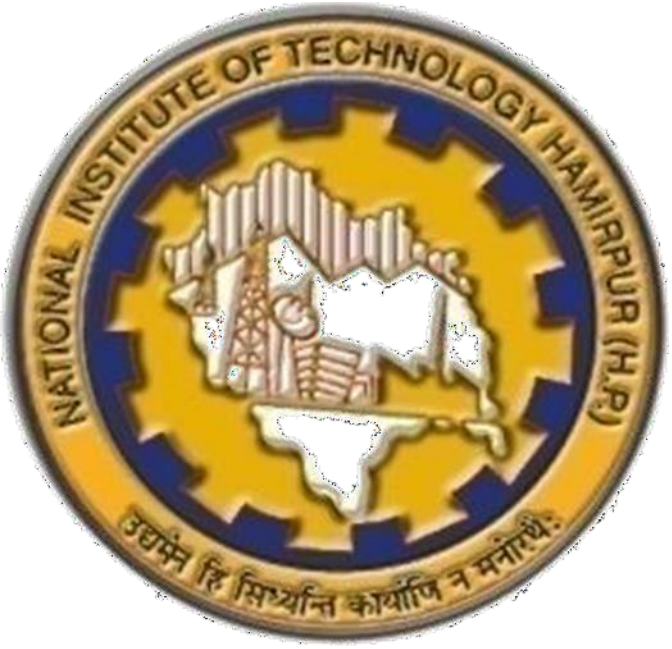
(Course Structure and Syllabi)

for

Minor Degree

in

Civil Engineering



Department of Civil Engineering

National Institute of Technology

Hamirpur

Hamirpur – 177005 (India)

राष्ट्रीय प्रौद्योगिकी संस्थान हमीरपुर
हमीरपुर (हि॰प्र॰) – 177 005 (भारत)
[भारत सरकार शिक्षा मंत्रालय के तहत एक राष्ट्रीय महत्व का संस्थान]
NATIONAL INSTITUTE OF TECHNOLOGY HAMIRPUR
HAMIRPUR (H.P.) - 177 005 (INDIA)
[An Institute of National Importance under Ministry of Education (Shiksha Mantralaya)]

Department of Civil Engineering

Teaching Scheme for Minor Degree in Civil Engineering

For Minor Degree in Civil Engineering the students are required to complete the following four courses with a total of twelve (12) credits.

Sr. No.	Code	Subject Name	Semester	L	T	P	C
1.	CE-310	Fundamentals of Surveying	5th	3	0	0	3
2.	CE-320	Civil Engineering Materials and Construction	6th	3	0	0	3
3.	CE-410	Environmental Engineering	7th	3	0	0	3
4.	CE-420	Construction Project Management	8th	3	0	0	3
						Total Credits	**12**

Department of Civil Engineering

Course Name: **Fundamentals of Surveying**

Course Code: **CE-310**

Course Type: **Minor Degree**

Contact Hours/Week: **3L** Course Credits: **03**

Course Objectives:

- To impart knowledge about the importance, objective and basic principles of surveying.
- To introduce the fundamental concepts of linear, vertical, and directional measurement and use of surveying equipment to collect data needed to develop topographical maps, traverses, and profiles.

Unit Number	Course Content	Contact Hours
UNIT-01	Introduction to surveying: plane and geodetic surveys, errors in measurements, maps, scales, plotting accuracy, topographic maps	**05L**
UNIT-02	Linear measurements: Direct and indirect methods, Chain and tape measurements, Optical methods- tacheometers, Electronic methods- EDMs/Total Station.	**05L**
UNIT-03	Vertical Measurement: Levelling and Contouring.	**05L**
UNIT-04	Measurement of directions: Compass surveying, Theodolites surveying.	**05L**
UNIT-05	Plane tabling	**05L**
UNIT-06	Modern Surveying methods: GPS, Remote sensing, GIS.	**06L**

Course Outcomes:

Upon successful completion of the course, the students will be able to

CO1 Acquire fundamental understanding of the engineering principles underlying surveying,

CO2 Understand and use surveying equipment ordinarily employed in surveying,

CO3 Data-gathering task that will ensure data meets the quality requirements of positioning.

Books and References:

1. Surveying–Vol 1 & 2 by K.R.Arora.
2. Plane Surveying by A. M.Chandra.
3. Surveying–Vol 1 & 2 by B.C. Punmia, Ashok K. Jain, Arun K. Jain,
4. Surveying: Theory and Practice by J.M. Anderson and E.M. Mikhail.

Department of Civil Engineering

Course Name: **Civil Engineering Materials and Construction**
Course Code: **CE-320**
Course Type: **Minor Degree**

Contact Hours/Week: **3L** Course Credits: **03**

Course Objectives:

- To impart knowledge about the civil engineering material and construction
- To introduce the fundamental concepts relevant to properties of materials and their application
- To enable the students to understand the factors that differentiate materials and accordingly their applications

Unit Number	Course Content	Contact Hours
UNIT-01	**Building Stones:** Classification of stones- Characteristics of good building stones, important types of building stones, their properties and stones and uses. **Brick:** Composition of brick-earth, manufacturing process of bricks, characteristics of good building bricks, classification and testing of bricks, special types of bricks and their uses. **Cement:** Composition, manufacture, Classification and applications, properties and IS specifications and tests, rate of hydration, special types, **Fine and Coarse aggregate:** Source, Impurities, Classification, and Characteristics. Sand - properties; **Timber:** Classification of timber trees, cross section of exogenous tree, hard wood and soft wood, Classification, seasoning, defects, wood product and its applications.	**10L**
UNIT-02	**Cement concrete and Special concrete:** Types, Properties of fresh and hardened concrete, test methods, proportioning of concrete mixes; Concrete construction - batching, mixing, placing, compacting, and curing of concrete, form work; Precast concrete and pre-stressed concrete; Recent developments in concreting; Iron and steel - Structural sections, properties and uses of structural steel; Recent developments in steel and concrete.	**8L**
UNIT-03	**Structural Components of building and building specification:** **Foundation:** bearing capacity of soils, improvement of bearing capacity , settlement of foundation ; Type, application, Description of spread, grillage, raft and pile foundations; **Masonry Construction:** Masonry construction using stones, bricks and other building blocks. Specifications for building stone, commonly used stones in masonry construction. Testing and preservation of stones. Bonds in masonry construction. Types, Bonds, defects. Different types of mortars used in masonry construction **Walls:** Types of load bearing and non-load bearing walls, Cavity walls ; Partition walls ; **Floor and Roofs:** type, Ground/Upper: Flat /Slopped. Beam/Band-Plinth, Sill, Lintel -Types and details, Stairs, Ramps - classification, application; **Form work:** Requirements, Load applied, Scaffolding. **Lintels and arches Floors and roofs- different types – flooring and roofing materials ;** **Doors, windows & ventilators:** Different types of doors, windows & ventilators. Ventilation: Functional requirement, Systems	**10L**
UNIT-04	**Non-Structural Components of building and building specification** **Building Finishes and Maintenance:** Plastering, pointing, Distempering, Color washing, and Painting. **Damp proofing anti- termite treatment and Water Proofing**: Causes, Prevention Methods, damp-proofing treatment, Materials used; Roof treatments for water proofing. **Fire Protection:** Fire safety requirement, fire extinguishing equipment.	**08L**

Course Outcomes:

Upon successful completion of the course, the students will be able to

CO1: Identify and describe construction material, structural and non-structural components
CO2: Apply principles of compatibility of material and construction methods
CO3: Assess the suitability and functional aspect of the materials and construction methodology

Books and References:

1. Building Materials by S.K. Duggal, New Age Int. Publishers.
2. Building Materials by P.C.Varghese, PHI
3. Building Construction by B.C.Punmia Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publication
4. Shetty, M. S., Concrete Technology, S.Chand & Co., New Delhi, 1992.

Department of Civil Engineering

Course Name: **Environmental Engineering**
Course Code: **CE-410**
Course Type: **Minor Degree**

Contact Hours/Week: **3L** Course Credits: **03**

Course Objectives

- To understand the necessity of environmental engineering.
- To know the basic of water quality & the concept of implementing standards.
- To know the basic of waste water.
- To basics of air pollution

Unit Number	Course Content	Contact Hours
UNIT-01	**Demand and Sources of Water:** Water demand - Population forecast - Water quality requirements - Sources and its yield for water requirements- Intake structures – Water quality parameters and their significance in domestic use.	**10L**
UNIT-02	**Water Treatment:** Design of treatment units such as aeration, sedimentation, coagulation and flocculation, filtration, Disinfection, water softening- Advanced water treatment methods.	**08L**
UNIT-03	**Waste water Generation, Collection & Conveyance:** Wastewater Quantity - Classification of wastewater - Sewerage system for domestic wastewater and storm water - Collections, and appurtenances - Design and layout of sewerage systems - Maintenance of sewerage systems - Physical, Chemical & Biological characteristics and their significance.	**10L**
UNIT-04	**Sources and effects of air pollutants:** Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles	**08L**

Course Outcomes:

Upon successful completion of the course, the students will be able to

CO1: Understand the basic concepts and analyze the requirements of a water supply project.
CO2: Experimentally analyze the water quality of an area and understand the need of safe and pure water.
CO3: Understand the basic concepts and analyze how to dispose of the sewage in an environment friendly manner.
CO4: Understand the nature and characteristics of air pollutants and air quality.

Books and References:

1. Water Supply Engineering by S.K. Garg, Khanna Publishers.
2. Water Supply & Pollution Control by Warren ViessmanJr, Mark J. Hammer &Elizabeth Perez, PHI
3. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata McGraw Hill, New Delhi, 1996.
4. Water Works Engineering by Syed R. Qasim, Edward M. Motley, GuangZhu,PHI
5. Sewage Disposal & Air Pollution Engineering by S.K. Garg, Khanna Publishers.

Department of Civil Engineering

Course Name: **Construction Project Management**
Course Code: **CE-420**
Course Type: **Minor Degree**

Contact Hours/Week: **3L** Course Credits: **03**

Course Objectives:

- To impart knowledge about types, merit, and demerits of construction contracts,
- To introduce the fundamental concepts relevant to CPM and PERT, and
- To enable students to understand organizational structures in the construction industry

Unit Number	Course Content	Contact Hours
UNIT-01	**Construction Management:** Significance, objectives and functions, resources for construction industry, stages in construction, Civil Engineering drawings.	**05L**
UNIT-02	**Construction Contracts & Specifications:** Types of contracts, contract document, specifications, important conditions of contract, arbitration.	**05L**
UNIT-03	**Construction Organization:** Principles of organization, communication in organization, types of organizations, temporary services, job layout.	**05L**
UNIT-04	**Construction Planning:** Work breakdown structure, pre-tender stage planning, contract stage planning, scheduling, bar charts, limitations of bar charts, milestone charts, preparation of material, equipment, labor, and finance schedule	**05L**
UNIT-05	**Critical Path Method:** Network techniques, element of a network, rules for developing networks, development logics, numbering events, time computations, activity floats, network updating. Resources profile, resources smoothing and resources leveling.	**05L**
UNIT-06	**Cost-Time Analysis:** Cost versus time, direct cost, indirect cost, total project cost, optimum duration, contracting network for cost optimization.	**05L**
UNIT-07	**Program Evaluation and Review Technique:** Probability concept in network, optimistic time, pessimistic time, most likely time, variance, standard deviation, slack, central limit theorem. probability of achieving completion time.	**06L**

Course Outcomes:

Upon successful completion of the course, the students will be able to

CO1: Understand purpose, types, merit, and demerits of construction contracts, CO2: Develop organizational structures in the construction industry,

CO3: Develop critical path method-based network and estimate various times and floats, and

CO4: Develop PERT network and find probability of completion of a project in specified duration.

Books and References:

1. Construction Planning & Management by P.S. Gehlot & B.M. Dhir
2. PERT & CPM -Principles & Applications by L.S. Srinath.
3. Project Planning & Control with PERT & CPM by B.C. Punmia & K.K. Khandelwal,
4. Construction Management & Planning by B. Sengupta & H. Guha,
5. Project Management: Planning and Scheduling Techniques by Bansal, V. K., Routledge: Taylor& Francis Group.