



MOTHERHOOD UNIVERSITY

Roorkee-Dehradun Road, Village Karoundi Post Bhagwanpur, Tehsil-Roorkee, Uttarakhand, India

FOURTH SEMESTER

CIVIL

ENGINEERING



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Sr. No.	Subject Code	Subject Name	Effective Teaching			Credits	Evaluation Scheme		
			L	T	P		Internal Assessment	External Assessment	Total Marks
			Hours/week						
THEORY									
1	MUPCE 401N	Advance Surveying	3	-	-	3	25	75	100
2	MUPCE 402N	Mechanics of Structures	4	-	-	4	25	75	100
3	MUPCE 403N	Water Supply & Waste Water Engineering	3	-	-	3	25	75	100
4	MUPCE404N	Irrigation Engineering	3	-	-	3	25	75	100
5	MUPCE405N	Concrete Technology	3	-	-	3	25	75	100
6	MUPCE406N	Environmental & Irrigation Engineering Drawing	3	-	-	3	-	100	100
PRACTICAL/PROJECT									
7	MUPCE451N	Advance Surveying Lab	-	-	4	4	25	75	100
8	MUPCE452N	Mechanics of Structures Lab	-	-	2	2	15	50	65
9	MUPCE453N	Water Supply & Waste Water Engineering Lab	-	-	2	2	15	75	90
10	MUPCE455N	Concrete Technology Lab	-	-	3	3	15	50	65
11	MUPCE456N	Environmental & Irrigation Engineering Drawing Lab	-	-	4	4	30	-	30
11	MUPGP451N	General Proficiency	-	-	1	1	25	-	25
12	MUPGP452N	Industrial Exposure (Assessment at University Level)	-	-	1	1	25	-	25
		TOTAL	19	-	17	36	275	725	1000



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MUPCE-401N	ADVANCED SURVEYING	3L:0T:4P	3 Credits
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Course Objectives

The objectives of the course is:

- The student will learn and implement survey techniques
- The will learn the concept of modern survey techniques
- The student will learn about remote sensing
- The student will learn about GPS

Course Outcomes

At the end of the Course, Student will be able:		Bloom's Level
CO1	To understand Plane Table Surveying Purpose of plane table surveying, equipment used in plane table survey: Setting of a plane table: a. Centering b. Leveling c. Orientation	K2
CO2	To understand Concept of contours and Theodolite surveying	K2
CO3	To understand the concept of tachometric surveying	K2
CO4	To understand the concept of curves	K2
CO5	To understand use of Modern Surveying equipment and techniques such as: a) EDM or Distomat b) Total station c) Introduction to remote sensing and GPS	K2

K1 – Remember K2- Understand K3-Apply K4-Analyze K5 – Evaluate K6 – Create



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ADVANCED SURVEYING

Subject Code: MUPCE-401N

L	T	P
3	-	4

RATIONALE

The important functions of a civil engineer includes the jobs of detailed surveying, plotting of survey data, preparation of survey maps and setting out works while framing the curriculum for the subject of surveying, stress has been given to the development of knowledge and skill in plane table surveying, theodolite surveying; tachometry surveying, curves and use of minor and mode instruments have been included in this subject.

Practical exorcises are framed so that student can check his work, have an idea of the results and the extent of error in the work done by him. As far as possible, the surveys done should be plotted, as this will also reveal errors in the work and develop skill in plotting.

DETAILED CONTENTS

1. Plane Table Surveying

Purpose of plane table surveying, equipment used in plane table survey:

Setting of a plane table:

- a. Centering
- b. Leveling
- c. Orientation

Methods of plane table surveying

- a) Radiation,
- b) Intersection
- c) Traversing
- d) Resection

Concept of Two point and Three point problems (Concept only)

Errors in plane table survey and precautions to control them. Testing and adjustment of plane table.



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2. Contouring:

Concept of contours, purpose of contouring, contour interval and horizontal equivalent, factors effecting contour interval, characteristics of contours, methods of contouring: Direct and indirect, use of stadia measurements in contour survey, interpolation of contours; use of contour map, Drawing cross section from a contour map; marking alignment of a road, railway and a canal on a contour map, computation of earthwork and reservoir capacity from a contour map

3. Theodolite Surveying:

Working of a transit vernier theodolite axes of a theodolite and their relation; temporary adjustments of a transit theodolite; concept of transiting, swinging, facelift, face right and changing face; measurement of horizontal and vertical angles. Prolonging a line (forward and backward) measurement of bearing of a line; traversing by included angles and deflection angle method; traversing by stadia measurement, theodolite triangulation, plotting a traverse; concept of coordinate and solution of omitted measurements (one side affected), errors in theodolite survey and precautions taken to minimize them; limits of precision in theodolite traversing. Height of objects—accessible and non-accessible bases

4. Tachometric surveying

Tachometry, Instruments to be used in tachometry, methods of tachometry, stadia system of tachometry, general principles of stadia tachometry, examples of stadia tachometry and Numerical problems.

5. Curves:

Simple Circular Curve:

Need and definition of a simple circular curve; Elements of simple circular curve - Degree of the curve, radius of the curve, tangent length, point of intersection (Apex point), tangent point, length of curve, long chord deflection angle, Apex distance and Mid-ordinate. Setting out of simple circular curve:

a) By linear measurements only:

- Offsets from the tangent
- Successive bisection of arcs
- Offsets from the chord produced

By tangential angles using a theodolite

Transition Curve:

Need (centrifugal force and super elevation) and definition of transition curve; requirements of transition curve, types of transition curve.

Vertical curve



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6. Introduction to the use of Modern Surveying equipment and techniques such as:

- a) EDM or Distom
- b) Total station
- c) Introduction to remote sensing and GPS

NOTE: No sketch of the instruments may be asked in the examination

PRACTICAL EXERCISES

1. Plane Table Surveying:

- a) Study of the plane table survey equipment Setting the plane table
Marking the North direction
Plotting a few points by radiation method
- b) Orientation by
Trough
compass Back
sighting
- c) Plotting few points by intersection, radiation and resection method
- d) Travers in genera with a plane table (at least five lines)

2. Contouring:

- a. Preparing a contour plan by radial line method by the use of a Tangent Clinometers / Tachometer
- b. Preparing a contour plan by method of squares
- c. Preparing a contour plan of a Road /Railway track/ Canal by taking cross sections.

3. Theodolite:

- a. Taking out the Theodolite, mounting on the tripod and placing it back in the box.
- b. Study of a transit vernier theodolite; temporary adjustments of theodolite
- c. Reading the vernier and working out the least count, measurement of horizontal angles by repetition and reiteration methods
- d. Measurement of vertical angles and use of tachometric tables
- e. Measurement of magnetic bearing of a line
- f. Running a closed traverse with a theodolite (at least five sides) and its plotting
- g. Height of objects with and without accessible bases



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4. Curves

- a. Setting out of a simple circular curve with given data by the following methods
 - i. Chain and Tape Method
 - ii. One Theodolite method
5. Demonstration of digital instruments through field visits to Survey of India and other government agencies.
6. Total Station (only demonstrations).

INSTRUCTIONAL STRATEGY

This is highly practice-oriented course. While imparting theoretical instructions, teachers are expected to demonstrate the use of various instruments in surveying; stress should be laid on correct use of various instruments so as to avoid minimize errors during surveying. It is further recommended that more emphasis should be laid in conducting practical work by individual students.

RECOMMENDED BOOKS:

1. Husain SK and Nag raj, MS "Text Book of Surveying" ; , S Chand and Co Ltd ., New Delhi
2. Deshpande , RS" A Text Book Surveying and Leveling" ; United Book Corporation, Pune,
3. Kanetkar, T Pand Kulkarni, SV. , "Surveying and Leveling" ,Poona ,AVG Parkashan, Pune
4. Kanetkar TP; and Kulkarni, SV;"Surveying and Leveling-Vol.2"AVG Prakashan , Pune
5. Punmia BC;"Surveying and Leveling " , Standard Publishers Distributors, Delhi.



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MUPCE -402N	MECHANICS OF STRUCTURE	4L:0T:2P	4 Credits
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Course Objectives

The objectives of the course is:

- concept of forces and bending moment
- concept of analysis of forces through diagrams
- slope and deflection
- properties of Materials

Course Outcomes

At the end of the Course, Student will be able:		Bloom's Level
CO1	To understand Properties of Materials Classification of materials and stress and strain	K2
CO2	To understand Shear Force and Bending Moment	K4
CO3	To understand Combined Direct and Bending Stresses	K2
CO4	To understand the concept of slope and deflection	K4
CO5	To understand column theory	K2

K1 – Remember K2- Understand K3-Apply K4-Analyze K5 – Evaluate K6 – Create



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MECHANICS OF STRUCTURES

Subject Code: MUPCE-402N

L	T	P
4	-	2

RATIONALE

This is a basic engineering subject. The purpose of the subject is to impart basic knowledge and skill regarding properties of materials, concept of stresses and strains, bending moment and shear force diagrams, second moment of area, bending and shear stresses, slope and deflection. The above knowledge will be useful for designing simple structural components.

DETAILED CONTENTS

1. Properties of Materials

Classification of materials, elastic materials, plastic materials, ductile materials, brittle materials. Introduction to tensile test, compressive test, impact test, fatigue test, torsion test on metals

2. Simple Stresses and Strains:

Concept of stress, normal and shear stresses,

Concept of strain and deformation, longitudinal and transverse strain, poisson's ratio, volumetric strain Hooke's law, module of elasticity and rigidity, Bulk modulus of elasticity, relationship between the elastic constants.

Stresses and strains in bars subjected to tension and compression. Extension of uniform bar under its own weight, stress produced in compound bars (two or three) due to axial load.

Stress-strain diagram for mild steel and HYSD steel, mechanical properties, factor of safety. Temperature stresses and strains

3. Shear Force and Bending Moment:

Concept of a beam and supports (Hinges, Roller and Fixed), types of beams: simply supported, cantilever, propped, over hang, cantilever and continuous Beams (only concept).



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Types of loads (dead load, live load, snow load, wind load seismic load as per IS Codes etc) and types of loading (point, uniformly distributed and uniformly varying loads)

Concept of bending moment and shear force, sign conventions

Bending Moment

Shear force diagrams for cantilever, simply supported and over hanging beams subjected to concentrated, uniformly distributed

Relationship between loads, Shear force and bending moment, point of maximum Bending moment and point of contra flexure.

4. Bending Stresses in Beams:

Concept of pure/simple bending

Assumptions made in the theory of simple bending, derivation and application of bending equation to circular cross-section, I section, T&L sections only

Moment of resistance

Calculations of bending stresses in simply supported beam

5. Combined Direct and Bending Stresses:

Concentric and eccentric loads single axis eccentricity only

Effect centric load on the section stresses due to eccentric loads, Numerical in the case of short columns.

Simple problems on stability of masonry dams and retaining walls.

6. Shear Stresses in Beams

Concept of shear stresses in beams, shear stress distribution in rectangular, circular I, T, L sections (Formula to be stated, no derivation)

7. Slope and Deflection

Necessity for determination of slope and deflection

Moment area theorem (no derivation numerical problems)

8. Columns

Theory of columns

Euler' sand Rankin Formula (No derivation)



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PRACTICALEXERCISES

- i) Determination of yield stress, ultimate stress, percentage elongation and plot the stress strain diagram and compute the value of young's modulus on mild steel
- ii) Testing of HYSD Steel
- iii) Determination of Young's modulus of elasticity for steel wire with seal's apparatus.
- iv) Determination of modulus of rupture of a concrete beam

INSTRUCTIONALSTRATEGY

Teachers are expected to give simple exercises involving the applications of various concepts and principles being taught in the subject. Efforts should be made to prepare tutorial sheets on various topics and students should be encouraged/guided to solve tutorial sheets independently. In the practical works, individual students should be given opportunities to do practical work, make observations and draw conclusions. Teachers should also conduct viva examination in which stress should be given on the understanding of basic concepts and principles.

RECOMMENDED BOOKS:

- i) Mechanics & Material by Kirpal Singh, Standard Publication, New Delhi
- ii) Ramamrutham, S., "Strength of Materials", Dhanpat Rai and Sons, New Delhi
- iii) Ram Chandra, "Applied Mechanics and Strength of Materials", Standard Publishers .Delhi:
- iv) Punmia, BC., " Strength of Materials" ,Standard Publishers, Delhi,



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MUPCE- 403N	WATER SUPPLY & WASTE WATER ENGINEERING	3L:0T:2P	3 Credits
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Course Objectives

The objectives of the course is:

- need of irrigation
- Water Logging and Drainage
- maintenance of purity of water
- necessity of water supply system

Course Outcomes

At the end of the Course, Student will be able:		Bloom's Level
CO1	To understand the necessity of water supply system	K2
CO2	To understand the concept of Standard Maintenance of purity of water and water treatment	K2
CO3	To understand the concept of sewerage system and concept of sewerage system	K2
CO4	To understand the concept Natural Methods of Sewerage Disposal	K2
CO5	To understand the concept of Building Drainage	K2

K1 – Remember K2- Understand K3-Apply K4-Analyze K5 – Evaluate K6 – Create



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WATER SUPPLY & WASTE WATER ENGINEERING

Subject Code: MUPCE-403N

L	T	P
3	-	2

RATIONALE

One of the basic necessities of life is water which is not easily available to a lot of people. Providing potable water at the first place then collection and disposal of waste solids and liquids are important activities of civil engineering field. This subject provides basic knowledge and skills in the field of water supply system and waste water disposal system. Classroom instructions should be supplemented by field visits to show functional details of water supply and waste water disposal systems. It will also be advantageous to invite professionals from field to deliver extension on specialized operations.

DETAILED CONTENTS

A. WATER SUPPLY

1. Introduction

Necessity and brief description of water supply system.

2. Quantity of Water

Water requirement Rate of demand and variation in rate of demand Per capita consumption for domestic industrial, public and fire fighting uses As per BIS standards (numerical problems)

Population Forecasting.

3. Quality of Water

Meaning of pure water and methods of analysis of water

Bacteriological tests and their significance Standard of potable water as per Indian Standard

Maintenance of purity of water (small scale and large scale quantity)

4. Water Treatment (brief introduction)

Sedimentation-purpose, types of sedimentation tanks

Coagulation flocculation- usual coagulation and their feeding

Filtration-significance, types of filters, their suitability

Necessity of disinfection of water forms of chlorination, break point chlorine.

Flow diagram of different treatment units, functions

- Aeration fountain



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- Mixer
- flocculate
- Classifier
- slow and rapid sand filters
- Chlorination chamber.

5. Conveyance of Water

Different types of pipes-cast-iron, PVC, steel, as best cement, concrete and lead Pipes. Their suitability and uses, types of joints in different types of pipes.

Appurtenances: Sluice, air, reflux valves, relief valves, scour valves, bib cocks, stopcocks, fire hydrants, and water meters their working and uses

Distribution site: Requirement of distribution, minimum head and rate, methods of layout of distribution pipes, Systems of water supply-Intermittent and continuous service reservoirs-types, necessity and accessories.

Wastage of water-preventive measures Maintenance of distribution system
Leakage detection.

6. Laying out Pipes

Setting out alignment of pipes

Excavation for laying of pipes and precautions to be taken in laying pipes in black cotton soil.

Handling, lowering beginning and jointing of pipes Testing of pipelines

Backfilling

Use of boning rods.

7. Building Water Supply

Connections to water main (practical aspect only)

Water supply fixtures and installations and terminology related to plumbing.

B. WASTE WATER ENGINEERING

8. Introduction

Purpose of sanitation

Necessity of systematic collection and disposal of waste

Definition of terms in sanitary engineering

Collection and conveyance of sewage

Conservancy and water carriage systems, their advantages and Disadvantages

Surface drains (only sketches): various types, suitability Types of sewage:

Domestic, industrial, storm water and its seasonal variation



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9. Sewerage System

Types of sewerage systems, materials for sewers, their sizes and joints
Appurtenance: Location, function and construction features. Manholes, drop manholes, tank hole, catch basin, inverted siphon, flushing tanks grease and oil traps, storm regulators, ventilating shafts

Laying and Construction of Sewers

Properties of sewage and IS standards for analysis of sewage Physical, chemical and bacteriological parameters.

10. Natural Methods of Sewerage Disposal

General composition of sewage and disposal methods Disposal by dilution.
Self purification of stream Disposal by land treatment.

11. Sewage Treatment

Meaning and principle of primary and secondary treatment and activated sludge process their flow diagrams. Introduction and uses of screens, grit chambers, and detritus tanks, skimming tanks, plain sedimentation tanks, primary clarifiers, secondary clarifiers, filters, control beds, intermittent sand filters, trickling filters, sludge treatment and disposal, oxidation ponds (Visit to a sewage treatment plant)

12. Building Drainage

Aims of building drainage and its requirements
Different sanitary fittings and installations
Traps, seals, causes of breaking seals



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LIST OF PRACTICALS

- 1) To determine turbidity of water sample
- 2) To determine dissolved oxygen of given sample
- 3) To determine pH value of water sample
- 4) To perform jar test for coagulation
- 5) To determine BOD of given sample
- 6) To determine residual chlorine in water
- 7) To determine conductivity of water and total dissolved solids (TDS) of given water sample.
- 8) To study the installation of following:
 - a) Water meter
 - b) Connection of water supply of building.
 - c) Pipe valves and bends
 - d) Water supply and sanitary fittings
- 9) To determine Bacteriological Quality of Drinking Water
- 10) To study and demonstrate the joining/threading of GI Pipes, CI Pipes, SW pipes, D.I. Pipes and PVC pipes.
- 11) To demonstrate the laying of SW pipes for sewers
- 12) Study of water purifying process by visiting a field lab.
- 13) To test house drainage

INSTRUCTIONAL STRATEGY:

Before imparting the instructions in the classroom, visits to waterworks and sewage treatment plants can go along way for increased motivation of students for learning in the class room. As the subject is of practical nature, lecture work is supplemented by field visits from time to time. Home assignments related to collection of information, pamphlets and catalogues from hard ware shop dealing water supply and sanitary fittings will be very helpful for the students.



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RECOMMENDED BOOKS:

1. Duggal KN; “Elements of Public Health Engineering”; S. Chand and Co. New Delhi
2. Kshirsagar,SR;“Water Supply Engineering” ;Roorkee Publishing House, Roorkee
3. Birdie, GS; “Water Supply and Sanitary Engineering” ;Dhanpat Rai and Sons ,Delhi
4. Garg, Santosh Kumar; “Water Supply Engineering”; Khanna Publishers, Delhi.
5. Garg, Santosh Kumar; “Sewage and Waste Water Disposal Engineering” ;Khanna Publishers ,Delhi.



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MUPCE-404N	IRRIGATION ENGINEERING	3L:0T:0P	3 Credits
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Course Objectives

The objectives of the course is:

- Need of irrigation
- Water Logging and Drainage
- Water requirement of crop
- River training

Course Outcomes

At the end of the Course, Student will be able:		Bloom's Level
CO1	To understand Necessity of irrigation	K1
CO2	To understand water requirement of crops	K2
CO3	To understand canal and tube well irrigation	K2
CO4	To understand cross drainage works and river training	K2
CO5	To understand Water Logging and Drainage	K3

K1 – Remember K2- Understand K3-Apply K4-Analyze K5 – Evaluate K6 – Create



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IRRIGATION ENGINEERING

Subject Code: MUPCE-404N

L	T	P
3	-	-

RATIONALE

Diploma holders in civil engineering have to supervise the construction, repair and maintenance of canals, head works, river training works, cross drainage works, regulatory and other works. Some of diploma holders are also engaged for preventing water logging and irrigation by tube wells. This subject imparts knowledge regarding hydrology, flow irrigation – storage and distribution system, constructional features of head works, river training works, cross drainage works, causes and prevention of water logging and construction of tube wells.

DETAILED CONTENTS

Introduction: Definition of irrigation

Necessity of irrigation.

History of development of irrigation in India

Major, medium and minor irrigation projects.

2. Water Requirement of Crops

Principal crops in India and their water requirements Crops–Kharif and Rabi

Soil water, soil crop and water relationships, duty, delta and base period, their relationship and transpiration

Gross commanded area (GCA), cultural commanded area (CCA), intensity of irrigation, irrigable area

3. Hydrological Cycle, Catchment Area and Run-off

Rainfall, definition rain-gauges–automatic and non-automatic, methods of estimating average rainfall (Arithmetic system); catchment area runoff, factors affecting run off, hydrograph, basic concept of unit hydrograph.

4. Methods of Irrigation

Flow irrigation–its advantages and limitations

Lift Irrigation–Tube well and open well irrigation, their advantages and disadvantages

Sprinkle irrigation conditions favorable and essential requirements for sprinkle irrigation, sprinkler system–classification and component parts



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Suitability of drip irrigation, layout, component parts, advantages.

5. Canals

Classification, appurtenances of a canal and their functions sketches of different canal cross-sections (unlined)

Various types of canal lining-their related advantages and disadvantages, sketches of different line canal x-sections

Breaches and their control

Maintenance of line and unlined canals.

6. Tube Well Irrigation

Introduction, occurrence of ground water, location and command, advantages and disadvantages, comparison with canal irrigation.

Tube wells, explanation of terms: water table, radius of influence, depression head, and cone of depression, confined and unconfined aquifers. Yield of a well and methods of determining yield of well.

Types of tube wells, cavity, strainer and slotted type;

Method of boring, installation of well assembly, development of well, pump selection and installation and maintenance

Water Harvesting Techniques: Need and requirement of various methods, Run-off from roof top and ground surface, techniques for ground water recharge construction of recharge pits and recharge well sand their maintenance.

7. Dams

Classification of dams; earthen dams-types, causes of failure; cross-section of zone earthen dams, method of construction, gravity dams-types, cross-sections of a dam, method of construction

Concept of small and micro dams.

Concept of spill ways and energy dissipaters Types and applications of Cofferdams.

8. Canal Head Works and Regulatory Works

Definition, object, general layout, functions of different parts of head works. Difference between weir and barrage.

9. Cross Drainage Works

Functions and necessity of the following types: aqueduct, super passage, level crossing, inlet and outlet, pipe crossing

Sketches of the above cross drainage works.



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10. Definitions of following Hydraulic Structures with Sketches:

Falls

Cross and head

regulators Outlets

Canal Escapes

11. River Training Works

Methods of river training, guide banks, retired (levees) embankments, groins and spurs, pitched island, cut-off.

12. Water Logging and Drainage

Definition of water logging—its causes and effects, detection, prevention and Remedies

Reclamation of soil

Surface and sub-surface drains and their layout

INSTRUCTIONAL STRATEGY

The teaching of the subject should be supplemented by field visits at regular intervals of time to expose the students to irrigation works. Students should be asked to prepare and interpret drawings of various irrigation works.



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RECOMMENDED BOOKS

1. Bharat Singh, 'Fundamentals of Irrigation Engineering', Chand and Bros, Roorkee.
2. Garg, Santosh Kumar, 'Irrigation Engineering and Hydraulics Structures', Khanna Publishers, Delhi.
3. Punmia, BC; and Pande Brij Bansi Lal, 'Irrigation and Water Power Engineering', Delhi, Standard Publishers Distributors, Delhi.
4. Sharma, RK; 'Text Book of Irrigation Engineering and Hydraulics Structures', Oxford and IBH Publishing Company, New Delhi.
5. Sharma SK; Principles and Practice of Irrigation Engineering', Prentice Hall of India Pvt. Ltd. New Delhi.



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MUPCE 405N	CONCRETE TECHNOLOGY	3L:0T:3P	3 Credits
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Course Objectives

The objectives of the course is:

- Importance of constituents of cement
- Proportioning of concrete
- Special concretes
- Hydration process

Course Outcomes

At the end of the Course, Student will be able:		Bloom's Level
CO1	To understand ingredients concrete	K1
CO2	To understand properties of concrete	K2
CO3	To understand admixtures (chemicals and minerals) for improving performance of concrete	K1
CO4	To understand special concrete	K2
CO5	To understand concreting operations	K3

K1 – Remember K2- Understand K3-Apply K4-Analyze K5 – Evaluate K6 – Create



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CONCRETE TECHNOLOGY

Subject Code: MUPCE-405N

L	T	P
3	-	3

RATIONALE

Diploma holders in Civil Engineering are supposed to supervise Concreting operations involving proportioning mixing, transporting, placing, compacting, finishing and curing of concrete. To perform above functions, it is essential to impart knowledge and skills regarding ingredients of concrete and their properties; properties of concrete in plastic and hardened stage, water cement ratio and workability; proportioning for ordinary concrete; concreting operations and joints in concrete.

DETAILED CONTENTS

THEORY

1. Introduction

Definition of concrete, uses of concrete in comparison to other building Materials.

2. Ingredients of Concrete

Cement: physical properties of cement; different types of cement as per IS Codes
Aggregates:

Classification of aggregates according to size and shape

Characteristics of aggregates: Particle size and shape, surface texture, specific gravity of aggregate; bulk density, water absorption, surface moisture, bulking of sand, deleterious materials, soundness

Grading of aggregates: coarse aggregate, fine aggregate; All-in- aggregate, fineness modulus; interpretation of grading charts

Water: Quality requirements as per IS: 456-2000

3. Water Cement Ratio

Hydration of cement, principle of water-cement ratio, Duff a Bram's Water-cement ratio law: Limitations of water-cement ratio law and its effects on strength of concrete

4. Workability

Workability factors affecting workability, Measurement of workability: slump test, compacting factor and Vee Bee consist meter; recommended slumps for placement in various conditions as per IS: 456-2000/SP-23



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5. Properties of Concrete

Properties in plastic state: Workability, Segregation, Bleeding and Harshness

Properties in hardened state: Strength, Durability, Impermeability,
Dimensional changes;

6. Proportioning for Normal Concrete

Objectives of mix design, introduction to various grades as per IS: 456-2000;
proportioning for nominal mix design as prescribed by IS456-2000

Adjustment on site for: Bulking of fine aggregate, water absorption of aggregate,
workability

Difference between nominal and controlled concrete Introduction to IS-10262-
2009-Code for controlled mix design

7. Introduction to Admixtures (chemicals and minerals) for improving performance of concrete.

8. Special Concretes (only features)

Concreting under special conditions, difficulties and precautions before, during
and after concreting

Cold weather concreting

under water concreting hot

weather concreting Ready

mix concrete Fiber

reinforced concrete

Polymer Concrete

Fly ash concrete Silica

fume concrete

9. Concreting Operations

Storing of Cement: Storing of cement in a warehouse storing of cement at site

Effect of storage on strength of cement

Mixing:

Hand mixing

Machine mixing- types of mixers, capacities of mixers, choosing appropriate
size of mixers, operation of mixers

Maintenance and care of machines

Transportation of concrete: Transportation of concrete using: wheel barrows,



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transit mixers, chutes, belt conveyors, pumps, tower crane and hoists etc.

Placement of concrete:

Checking of form work, shuttering and precautions to be taken during placement

Compaction:

Hand compaction

Machine compaction- types of vibrators, internal screed vibrators and form vibrators.

Selection of suitable vibrators for different situations finishing concretes labs-screening, floating and troweling

Curing:

Objectives of curing, methods of curing like pouncing, membrane curing, chemical curing.

Duration for curing and removal of form work

Jointing: Location of construction joints, treatment of construction joints, expansion joints in buildings-their importance and location

Defects in concrete: Identification of and methods of repair

10. Importance and methods of non-destructive tests (introduction only)

NOTE: **A field visit may be planned to explain and show the relevant things.



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PRACTICAL EXERCISES:

- i) To determine the physical properties of cement as per IS Codes
- ii) To determine flakiness and elongation index of coarse aggregates
- iii) To determine silt in fine aggregate
- iv) Determination of specific gravity and water absorption of aggregates
- v) Determination of bulk density and voids of aggregates
- vi) To determine surface moisture in fine aggregate by displacement method
- vii) Determination of particle size distribution of fine, coarse and aggregate by Sieve analysis (grading of aggregate)
- viii) To determine necessary adjustment for bulking of fine aggregate
- ix) To determine workability by slump test:
- x) To verify the effect of water, fine aggregate /coarse aggregate ratio and aggregate/Cement ratio on slump
- xi) Non destructive test on concrete by:
 - a) Rebound Hammer Test
 - b) Ultrasonic Pulse Velocity Test
- xii) Tests for compressive strength of concrete cubes for different grades of concrete.

INSTRUCTIONAL STRATEGY:

This subject is of practical nature. While imparting instructions, teachers are expected to organize demonstrations and field visits to show various stages of concreting operations. While working in the laboratory, efforts should be made to provide extensive practical training to students so as to make them confident in the preparation and testing of concrete. Teachers should also organize viva examinations to develop understanding about concepts and principles involved. The experiments may be demonstrated to students through video programmes developed in the field of concrete technology "by NITTTR, Chandigarh.



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RECOMMENDED BOOKS

1. Kulkarni, PD; Ghosh, RK and Phull, YR; "Text Book of Concrete Technology"; Oxford and IBH Publishing Co. New Delhi.
2. Gupta BL and Gupta Amit; "Text Book of Concrete Technology"; Standard Publishers Distributors, Delhi.
3. Varshney, RS; "Concrete Technology"; Oxford and IBH Publishing, New Delhi.
4. Neville, AM; "Properties of Concrete" Pitman (ELBS Edition available), London.
5. Orchard; "Concrete Technology"; Vol I, II, and III.
6. Gambhir, ML; "Concrete Technology"; Mac Milan India Ltd., New Delhi.



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MUPCE -406N	ENVIRONMENTAL & IRRIGATION ENGINEERING DRAWING	3L:0T:4P	3 Credits
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Course Objectives

The objectives of the course is:

- Practice of reading water supply and sanitary engineering working drawing
- different cross sections
- rain water harvesting
- importance of manholes

Course Outcomes

At the end of the Course, Student will be able:		Bloom's Level
CO1	To understand Cross section of standard types of open drains (circular, V-shaped and U-shaped) with their foundations	K1
CO2	To understand Traps, manholes and inspection chamber	K2
CO3	To understand Bath room and W.C connection	K2
CO4	To understand Layout plan of a canal head works.	K2
CO5	To understand Layout and cross section of rain water harvesting system	K2

K1 – Remember K2- Understand K3-Apply K4-Analyze K5 – Evaluate K6 – Create



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ENVIRONMENTAL & IRRIGATION ENGINEERING DRAWING

Subject Code: MUPCE-406N

L	T	P
3	-	4

RATIONALE

Diploma holders in Civil Engineering are expected to supervise construction of water supply wastewater treatment works and irrigation structures. This subject aims skills for preparing water supply waste water and irrigation engineering drawings to develop competencies for reading the drawings, and their execution in their field

DETAILED CONTENTS

Drawings Exercises

A) ENVIRONMENTAL ENGINEERING DRAWING

1. Drains and Sewers

Cross section of standard types of open drains (circular, V-shaped and U-shaped) with their foundations

Cross section of earthen ware and RCC sewer pipes

Cross sections of masonry sewers (circular and egg shaped)

2. Traps, man holes and inspection chamber

Detailed section of floor trap and gully trap detailed plan and section of a inspection chamber Detailed plan and section of a manhole

3. Septic Tank and Soak Pit

Detailed plan and cross-sections of a domestic septic tank with soak pit for 25users

4. Bathroom and W.C connections:

Cross-section through the external wall of lavatories at ground and first floor showing the one and two pipe system and the connections of the lavatory to inspection chamber

Plan of a bathroom showing positions of lavatory, bathtub, wash-basin, taps and showers



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5. Practice of reading water supply and sanitary engineering working drawings (PWD/ urban Development agencies) including hot water and cold water supply system of at room set.

B) IRRIGATIONENGINEERINGDRAWING:

1. Typical cross-section of a channel
2. L-section of a channel for given data
3. Typical cross section of an unlined and lined channel in cutting, partly cutting and partly filling and fully in filling with given design data.
4. Layout plan of a canal head works.
5. Draw the typical L-section of a weir
6. Draw the X-section of an Earthen Dam
7. Homogeneous
8. Zone d type
9. Diaphragm type
10. Cross section of a tube well
11. 6 Layout and cross section of rain water harvesting system.

INSTRUCTIONAL STRATEGY

Teachers are expected to develop skills in preparation and interpretation of irrigation water supply and waste water engineering drawings as per BIS codes of practice .Attention must be paid towards line work, specifications writing, dimensioning, proportioning and accuracy for different intervals of time. Reading and interpreting actual field drawings should also be practiced so as to develop necessary competency in the students.



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RECOMMENDED BOOKS:

1. Loyal JS“ Civil Engineering Drawing”, Satya Parkashan, New Delhi
2. Chandel RP“ Civil Engineering Drawings”
3. Kumar; NS“ Civil Engineering Drawing “IPH, New Delhi
4. Malik RS and Meo GA, “Civil Engineering Drawing” Asian Publishing House, New Delhi
5. Meo GA, “Civil Engineering Drawing” Asian Publishing House, New Delhi



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GENERAL PROFICIENCY

Subject Code: MUPGP- 451N

L	T	P
-	-	1

Industrial training provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work.

For this purpose, students at the end of fourth semester need to be sent for industrial training for a minimum of 4 weeks duration to be organized during the semester break starting after IV Semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that trainings may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and material training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. A teacher may guide a group of 4-5 students. A minimum of one visit by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.



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INDUSTRIAL EXPOSURE

Subject Code: MUPGP-452N

L	T	P
-	-	1

Internal assessment and external assessment have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process , practices in industry / field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weight age to performance in testing, general behavior, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry, if any. The components of evaluation will include the following.

- i. Punctuality and regularity 15%
- ii. Initiative in learning new things 15%
- iii. Relationship with worker 15%