# CIVIL ENGINEERING, UEC, UJJAIN.

Syllabus for Four Years Bachelor of Technology Degree Course as per NEP-2020

**July-2024**

| SUBJECT | | Exam Duration | Contact Hours per Week | | | Credits | Max. Marks | Min Pass Marks |
|---|---|---|---|---|---|---|---|---|
| Code | Title | | L | T | P | | | |
| CE-4401 | Survey – I | 3 Hours | 3 | 1 | 2 | 4 + 1 | 70 | 22 |

**Course Objective :** To impart the students the principle & working of surveying instruments, calculation of area, volume & determination of difference in levels & heights and distance and drawing of plan so that proper execution can be made at the time of construction or wherever required.

**Course Outcomes :** On the completion of this course the students will be able to :-

- Apply the principles of surveying and its implications to various civil engineering applications.
- Utilize conventional surveying equipment such as plane table, auto level for evaluating length, area and volume.
- Draw plan of various areas and Plotting of profile levelling and contours for various civil engineering applications.
- Utilize theodolite and tacheometer & determining height and distance of various structures.
- Utilize Total Station and determine height and distance of various structures.

**UNIT - I :**

**Plane Table Surveying :** Introduction, Principle, and accessories used in plane tabling, advantages and disadvantages. Setting of Plane Table, Orienting the Table. Methods of Plane Tabling, Radiation, Intersection, Measurement of Area and Volume, Minor Instruments.

**UNIT – II :**

**Topographic Surveying :** Introduction, Procedure of Topography Survey, Route Survey (L-Section & Cross-Section), Contouring (Characteristics & Methods).

**UNIT - III :**

**Theodolite :** Introduction & important definitions, Construction detail of Transit Theodolite, temporary and permanent adjustments, measurement of horizontal and vertical angles, Traversing, Closing error, traverse computations, and omitted measurements etc.

**UNIT - IV :**

**Tachometery :** Principle of tacheometric systems, construction details, stadia system, uses of anallatic lens, tangential system, subtense system, instrument constant (laboratory & field), field work, use of tacheometry for traversing and contouring.

**UNIT - V :**

**Trigonometric Leveling :** Trigonometrical leveling, determination of height and distance when the base of the object is accessible and inaccessible, curvature and refraction correction, reciprocal leveling. Introduction to Total Stations.

**1 Hour Lecture (L) = 1 Credit  1 Hour Tutorial (T) = 1 Credit  2 Hours Practical (P) = 1 Credit**

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**Laboratory Work :-**

1. Plane Table Survey by Radiation Method.
2. Plane Table Survey by Intersection Method.
3. Contouring of small areas.
4. Profile Leveling (L-Section & Cross-Section).
5. Study of Theodolite and measurements of horizontal and vertical angles.
6. Measurement of horizontal angles by Reiteration method.
7. Determining the height and distance of lighting conductor when the base of the object is inaccessible.
8. Determination of Tachometric constants.
9. Determination of height and distance of a point by tachometric method.

**Reference Books :-**

1. T.P. Kanetkar – Surveying and Leveling Vol.I&II, Pune Vidhyarthi Griha Prakashan, Pune.
2. B.C. Punmia – Surveying Vol.I&II, Laxmi Publications New Delhi.
3. S.K. Duggal – Surveying and Leveling, Tata McGraw Hill.
4. H.K. Basak – Surveying and Leveling, Tata McGraw Hill.
5. K.R. Arora – Surveying Vol.I&II, Standard Book House

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| Code | Title | | L | T | P | | | |
| CE-4402 | Environmental Engineering – I | 3 Hours | 3 | 1 | 2 | 4 + 1 | 70 | 22 |

**Course Objective :**

- To demonstrate the various sources of water and water demands for estimation of water requirements for a location.
- To explain the different methods of population forecasting, fluctuations in water demand and various components considered in planning for water supply scheme.
- To demonstrate the potable water quality and examine the different physical, chemical and biological characteristics of water.
- To illustrate the various types of pipes, pumps and intakes considered in the planning of water supply scheme.
- To elucidate the various unit operations and processes adopted in the design of water treatment plant. 6. To discuss the consideration in planning and design of distribution system.

**Course Outcomes :** On the completion of this course the students will be able to :-

- Estimate the future water requirements considering the available water resources and future population growth for any locality.
- To interpret the quality of water and necessary requirements for domestic purposes.
- To identify the suitable components such as intakes, pipes and pumps in planning for water supply engineering.
- To organize and design different unit processes and operations in water treatment.
- To estimate the quantitative requirements of distribution system and analyze the pipes accordingly.
- To plan plumbing system for houses.

**UNIT - I :**

Quality of water from different sources, demand & quality of water, fire demand, water requirement for various uses, fluctuations in demand, forecast of population.

**UNIT – II :**

Impurities of water and their significance, water-borne diseases, control of water borne diseases, physical, chemical and bacteriological analysis of water, water quality standards for different uses. Intake structures, design of intakes and conveyance of water, pipe materials, pumps-operation and pumping stations.

**UNIT - III :**

Water Treatment methods, Primary & secondary treatment, theory and design of sedimentation, coagulation, filtration, disinfection, aeration & water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment, detailing & maintenance of treatment limits.

**UNIT - IV :**

Conveyance and distributions systems, Layout and hydraulics of different distribution systems, pipe fittings, valves and appurtenances, analysis of distribution system. Hardy cross method, leak detection & control, maintenance of distribution systems, service reservoir capacity and height of reservoir.

**1 Hour Lecture (L) = 1 Credit 1 Hour Tutorial (T) = 1 Credit 2 Hours Practical (P) = 1 Credit**

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**UNIT - V :**

Rural water supply schemes, financing and management of water supply project, water pollution control act, conservancy & water carriage system, sanitary appliance and their operation, building drainage system of plumbing.

**List of Experiments :-**

1. Study of the various standards for water.
2. Study of sampling techniques for water.
3. Measurement of turbidity.
4. To determine the coagulant dose required to treat the given turbid water sample.
5. To determine the conc. of chlorides in a given water samples.
6. Determination of hardness of the given sample.
7. Determination of residual chlorine by "Chloroscope" or any other method.
8. Determination of Alkalinity in a water samples.
9. Determination of Acidity in a water samples.
10. Determination of Dissolved Oxygen (DO) in the water sample.

**Suggested Books and Reading Materials :-**

1. Water Supply Engineering by B.C. Punmia - Laxmi Publications (P) Ltd. New Delhi.
2. Water Supply & Sanitary Engg. by G.S. Birdi - Laxmi Publications (P) Ltd. New Delhi.
3. Water & Waste Water Technology by Mark J. Hammer - Prentice - Hall of India, New Delhi.
4. Environmental Engineering - H.S. Peavy & D.R.Rowe - Mc Graw Hill Book Company, New Delhi.
5. Water Supply & Sanitary Engg. by S.K. Husain.
6. Water & Wastewater Technology - G.M. Fair & J.C. Geyer.
7. Relevant IS Codes.
8. Manual of CPHEEO by MEF.

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|---|---|---|---|---|---|---|---|---|
| Code | Title | | L | T | P | | | |
| CE-4403 | Concrete Technology | 3 Hours | 3 | 1 | 2 | 4 + 1 | 70 | 22 |

**UNIT - I :**

**Introduction :** Classification, properties, grades, advantage & disadvantages of concrete, Ingredients of concrete, types of cement, aggregates, water, admixtures, Inspection & testing of materials as per Indian Standard Specifications.

**UNIT – II :**

**Properties of Fresh and Hardened Concrete :** Introduction, Workability, Testing of concrete, Factors affecting, Rheology of concrete, Compressive & Tensile strength, Stress and strain characteristics, Shrinkage and temperature effects. Creep of concrete, Permeability, durability, thermal properties & micro-cracking of concrete.

**UNIT - III :**

**Design of Concrete Mix :** Various classical methods of concrete mix design, I.S. code method, basic considerations and factors influencing the choice of mix design, acceptance criteria for concrete, concrete mixes with Surkhi and other Pozzolanic materials, design of plastic concrete mix, computer aided design of concrete mix.

**UNIT - IV :**

**Production and Quality Control of Concrete :** Production of crushed stone aggregate, batching equipments for production and concreting, curing at different temperatures, Concreting underwater, hot & cold weather condition, statistical quality control, field control, non-distructive testing, repair technology for concrete structures, Inspection & Testing of Concrete.

**UNIT - V :**

**Special Concretes :** Light weight concrete, Ready mix concrete, Vacuum concrete, Ferrocement, Fiber reinforced concrete, Polymer concrete composites, Shotcrete, Guniting, Rubble concrete, Resin concrete, Prestressed concrete, Heat resistant concrete, Mass concrete, Temperature control of mass concrete.

**List of Experiments :-**

1. Tests on Aggregates.
2. Tests on Cement.
3. Determination of compressive strength of concrete with different cement grades.
4. Determination of workability of concrete by slump test.
5. Determination of workability by compacting factor apparatus.
6. Determination of workability by Vee Bee consistometer.
7. Nondestructive testing of concrete by Rebound hammer test.
8. Nondestructive testing of concrete by ultrasonic Method.
9. Test for the effect of admixtures on the concrete compressive strength.
10. Testing of microconcrete.
11. Design of concrete mix.

**1 Hour Lecture (L) = 1 Credit  1 Hour Tutorial (T) = 1 Credit  2 Hours Practical (P) = 1 Credit**

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**Suggested Books and Reading Materials :-**

1. Varshney RS; Concrete Technology; Oxfored & IBH publishing co.
2. Gambhir ML; Concrete Technology – TMH.
3. Sinha SN; Reinforced Concrete Technology; TMH.
4. New Building Materials Published by B.M.T.P.C., New Delhi.
5. Hand books on Materials & Technology - Published by BMTPC & HUDCO.
6. Mohan Rai & M.P. Jai Singh; Advances in Building Materials & Construction.
7. Jackson N; Civil Engineering materials. 8. Properties of Concrete - A.M. Neville - Pearson Educatio

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|---|---|---|---|---|---|---|---|---|
| Code | Title | | L | T | P | | | |
| CE-4404 | Quantity Estimation & Costing | 3 Hours | 3 | 1 | 2 | 4 + 1 | 70 | 22 |

**Course Objective :**

- To demonstrate the different types of estimates and procedure adopted in measurement of work in construction projects.
- To illustrate the different methods for preparation of building estimate.
- To explain the procedure for measurement of work done, factors considered and rate analysis of work done.
- To introduce the procedure adopted in valuation of projects.
- To illustrate the estimate for road section and culvert.

**Course Outcomes :** On completion of the course, the students will be able to :-

- Adopt the suitable type of estimate in varying situations.
- Prepare detailed building estimate using center line method and individual wall method.
- Prepare the estimates for roads and culverts.
- Measure the work and analyze rates for construction project.
- Estimate the value of a property.

**UNIT - I :**

**Introduction :** Purpose and importance of estimates, principles of estimating. Mode of measurement, measurement sheet and abstract sheet; bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects. Methods of taking out quantities of items of work.

**UNIT – II :**

**Rate Analysis :** Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)

**UNIT - III :**

**Detailed Estimates :** Preparing detailed estimates of various types of buildings by Long Wall-Short Wall and Centre Line Method, Estimate of R.C.C. Beam, Slab, Column & Footing, earth work calculations for roads and estimating of culverts, Services for building such as water supply, drainage and electrification.

**UNIT - IV :**

**Cost of Works :** Factors affecting cost of work, overhead charges, Contingencies and work charge establishment, various percentages for different services in building. Preparation of DPR.

**UNIT - V :**

**Valuation :** Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.

| 1 Hour Lecture (L) = 1 Credit | 1 Hour Tutorial (T) = 1 Credit | 2 Hours Practical (P) = 1 Credit |
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**List of Experiments / Field Work (Expandable) :-**

1. Preparing detailed estimate by long wall, short wall & centre line methods.
2. Two room building.
3. Two room building with verandah.
4. Residential building and other buildings.
5. Road Estimate: Earthwork calculation.
6. Numerical problems (Analysis of rates).
7. Numerical problem (Valuations).

**Reference Books :-**

1. Estimating & Costing ion Civil Engineering by Dutta, B.N.
2. Estimating, Costing, Specification and Valuation in Civil Engineering by Chakraborti, M.
3. Contracts and Estimates by Patel, B.S.

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|---|---|---|---|---|---|---|---|---|
| Code | Title | | L | T | P | | | |
| CE-4405 | Water Resources Engineering – I | 3 Hours | 3 | 1 | 0 | 4 + 0 | 70 | 22 |

**Course Objective :**

- To understand the various types of irrigation, irrigation methods and crop water requirements.
- To understand the suitability of water for irrigation.
- To build on the student's background in hydrology and understanding of water resources systems.
- To develop the understanding on various hydraulic structures in cross drainage works.

**Course Outcomes :** On the completion of this course the students will be able to :-

- Estimate the optimal water use for growing the crops and apply methods for 1 protecting land from water logging.
- Analyze different components of hydro-logical cycle and understand the concepts of different types of hydro-graph.

**UNIT - I :**

Irrigation water requirement and Soil-Water-Crop relationship: Irrigation, definition, necessity, advantages and disadvantages, types and methods. Irrigation development. Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination. Irrigation methods surface and subsurface, sprinkler and drip irrigation. Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

**UNIT – II :**

Ground Water and Well irrigation: Confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries. Ground water recharge-necessity and methods of improving ground water storage. Water logging-causes, effects and its prevention. Salt efflorescence causes and effects. reclamation of water logged and salt affected lands. Types of wells, well construction, yield tests, specific capacity and specific yield, advantages and disadvantages of well irrigation.

**UNIT – III :**

**Hydrology :** Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, rain gauge net works, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves, Infiltration and infiltration indices, evaporation stream gauging.

**UNIT – IV :**

Run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph.

**UNIT - V :**

Types of floods and their estimation by different methods, probability and frequency analysis, flood routing through reservoirs and channels, flood control measures, economics of flood control, confined and unconfined aquifers, aquifer properties, hydraulics of wells under steady flow conditions, infiltration galleries

**Reference Books :-**

1. Irrigation & Water Power Engineering - Dr. B.C. Punmia, Dr. Pande, B.B. Lal.
2. Irrigation, Water Resources & Water Power by Dr. P.N. Modi.
3. Irrigation Engineering by Varshney.
4. Irrigation Engineering by Santosh Kumar Garg.
5. Irrigation, Water Power & Water Resources Engg. by K.R. Arora.

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