



# SARDAR PATEL UNIVERSITY, BALAGHAT (MP)

School of Engineering and Technology

Syllabus

Course: Diploma

Branch: Civil Engineering

Semester: VI<sup>th</sup>

Academic Session: 2024-2025

w.e.f: 02/09/2024

## DCE061 ENVIRONMENTAL ENGINEERING

### Course Contents

#### Course Objectives:

1. To provide fundamental awareness about the water sources, population forecasting, water quality.
2. To develop an interest in pursuing the subject for P.G. studies because environmental pollution and its management is a critical topic of the hour.
3. To develop skills of designing a water treatment plant.
4. Developing a professional skill for design of water distribution system and environmental problems related to civil engineering.

#### UNIT - I

**Introduction:** Duties of P.H. Engineer, Need and importance of P.H.E, Quantity of Water& Source of water: Demands of water: Domestic, Industrial, Commercial & Institutional, Public use, Losses and wastes, Fire demand ;Factors affecting rate of Demand, Variations of water demands, Forecasting of population, Methods of forecasting of population, Design period for water supply scheme. Estimation of quantity of water supply required for a town or city, Types of water supply schemes

**Source of water** Surface and Subsurface sources of water Ground water, Open well, Tube-Well infiltration well, infiltration gallery, infiltration pipes. Construction of dug well, Construction of tube well, Well Testing. Yield of well Intake Structures-Definition and types, Factors governing the location of an intake structure, Water conservation, Ground water recharging – Necessity Importance and advantages

#### UNIT - II

**Quality of Water & Purification of Water :** Effect of different impurities on water, surface/ground water , Water borne disease. Need for analysis of water, Characteristics of water- Physical, Chemical and Biological, Testing of water for Total solids, hardness, chlorides, dissolved Oxygen, pH, Bacteriological tests, Sampling of water, Water quality standards as per I.S. **Purification of Water :** Screening- Types of screens, Aeration- objects and methods of aeration, Plain sedimentation, Sedimentation with coagulation, principles of coagulation, types of coagulants, Jar Test, process of coagulation, types of sedimentation tanks, Filtration theory of filtration, classification of filters : slow sand filter, rapid sand filter, pressure filter, domestic filter, filter media, construction and working of slow sand filter and rapid sand filter, Disinfection: Objects, methods of disinfection, Chlorination- Application of chlorine, forms of chlorination, types of chlorination practices, residual chlorine and its importance, Flow diagram of water treatment plants **Conveyance and Distribution of Water :** Types of Pipes used for conveyance of water, choice of pipe material, Types of joints & Types of valves- their use, location and function on a pipeline. Methods of distribution of water- Gravity, pumping, and combined system Service reservoirs – functions and types , Layouts of distribution of water-

Dead end system, grid iron system, circular system, radial system ; their suitability, advantages and disadvantages

### **UNIT - III**

**Building Sanitation :** Importance and necessity of sanitation, Necessity to treat domestic sewage, Recycling and Reuse of domestic waste Definitions- Sewage, sullage, types of sewage, Definitions of the terms related to Building Sanitation-Water pipe, Rain water pipe, Soil pipe , Silage pipe, Vent pipe, Building Sanitary fittings- Water closet – Indian and European type, flushing cistern, wash basin, sinks, Urinals, Traps- types, Systems of plumbing – one pipe, two pipe, single stack, layout plan for building sanitary fittings (drainageplan) , inspection and junction chambers, their necessity, location.

### **UNIT - IV**

**Systems of Sewerage:** Types of Sewers, Systems of Sewerage, Principle of Design of sewers, self cleansing velocity and non scouring velocity Laying, Testing and maintenance of sewers. Sewer Appurtenances, Manholes and Drop Manhole-component parts, location, spacing, Sewer Inlets, Street Inlets, Flushing Tanks – manual and automatic. **Analysis of Sewage:** Characteristics of sewage, B.O.D./ C.O.D. and significance. , Aerobic and anaerobic process, Madhya Pradesh Pollution Control Board Norms for the discharge of treated sewage.

### **UNIT - V**

**Treatment of Sewage :** Objects of sewage treatment, General layout and flow diagram, Screening, Grit removal, Skimming, Sedimentation of sewage, Sludge digestion, Trickling filters, Activated sludge process, Disposal of sewage, Septic tank, Oxidation pond, Oxidation ditch. Common Complaints in the operation of septic tank and remedies

**Rural Sanitation** Environmental Sanitation Necessity and importance, Rural sanitation Types of Privies – Aqua privy and Bore Hole Latrine construction and working Composting (Nade or Vermiculture).

### **Course Outcome:**

CO1 Understand the need and importance of phe

CO2 Understand the quality of water and purification of water.

CO3 Understand the urban sanitation.

CO4 Understand the sewage system.

CO5 Understand the treatment of sewage

**Reference Books:**

<b>S.No.</b>	<b>Title</b>	<b>Author</b>	<b>Publisher</b>
1	Text Book of Water Supply and sanitary Engg.	Husain. S.K.	Ox ford and IBH Publishing Co. New Delhi
2.	Water supply and Sanitary Engg.	Birdie,G.S.and Bridie, J.S.	Dhanpat Rai & Sons, Delhi
3	Jal Apurti Evam Swachchhata Engg.	Sunil and Rajjan	Nav bhart Prakashan, Meerut
4	Water Supply & Sanitary Engg.	Guruchara n Singh	Standard Publishers
5	Lok Swasthya Yantriki	Saxena,A.K.,	Deepak Prakashan Gwalior



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## DCE062 QUANTITY SURVEYING & COSTING-II

### Course Contents

#### Course Objectives:

1. To provide the student with the ability to estimate the quantities of item of works involved in buildings,
2. Water supply and sanitary works, road works and irrigation works,
3. To also to equip the student with the ability to do rate analysis,
4. Valuation of properties and preparation of reports for estimation of various items.

#### UNIT - I

**Estimate of R.C.C. Structure:** Estimate of slab, beam, T-beam. Estimate of R.C.C. column with its footing. Preparation of Abstract of above items, Preparation of Bar bending schedule, and to calculate amount of steel.

#### UNIT – II

**Estimate of Steel/ Timber Structures:** Estimate of steel column (Stanchion) Estimate of steel Truss and Gusset Plate. Estimate of Roof covering materials. G.I. Roof, A.C.Roof, Estimate of steel frames for Doors & Windows. Estimate of Wooden Doors and Windows Estimate of Roof Covering materials

#### UNIT – III

**Estimate of Culverts & Bridges:** Estimate of Hume pipe culvert with played type of wing wall, Turn wall, face wall. Estimate of R.C.C. slab bridge, straight type wing walls.

#### UNIT – IV

**Estimate of Water Supply and Sanitary Fittings:** Detailed Estimate of Water Supply for building work, Detailed Estimate of Sanitary works for building work, Estimate of S.W. pipe line Estimate of Septic Tank.

#### UNIT – V

**Valuation & Rent Fixation:** Definition, Necessity of Valuation, Definition Cost price, Value, Difference between them. Types of value, Book value, scrap value, salvage value, Market value, Depreciation, obsolescence, Sinking fund. Methods of calculation of depreciation, straight line method, sinking fund method constant percentage method, quantity survey method. Computation of capitalized value, Gross income, outgoing, net income, Years purchase. Types of outgoing and their percentages Valuation of Lands & Buildings, factors affecting their valuation, Fixation of Rent as per PWD practice.

**Course Outcome:**

CO1 Understand the estimate of RCC structure

CO2 Analysis of estimate of steel structure

CO3 Analysis of estimate water supply and sanitary system.

CO4 Analysis of estimate rate fixation and valuation

CO5 Understand the estimate of culverts and bridges.

**Reference Book:**

S.No	Title	Author	Publisher
1	Estimating and Costing	By. B.N. Dutta	S. Datta & Co. Tagroe Path Motilal Bose Road, Lucknow.
2.	Estimating and costing & Valuation	By Rangwala	Charotar Publications Station Road, Anand
3	Estimating & Costing	By Birdie, J.C, Kapoor	Dhanpat Rai & Sons Delhi and Jullunder.
4	Estimating & Costing Vol-I & Vol.-II	By J.C. Malhotra	Khanna Publishers 2B, Nath Market, Nai Sarak New Delhi



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## DCE063 STRUCTURAL DESIGN & DRAFTING-II (STEEL)

### Course Content:

#### Course Objectives:

1. To know about the merits of steel structures.
2. To know about shapes and grades of structural steel available.
3. To understand the behavior of structural steel under tension, compression and flexure.
4. Understand the behavior of plate girders.
5. Understand the behavior of column bases and gantry girders.

#### UNIT - I

**Introduction:** Types of sections used, Hollow Square section Rectangular section Tubular section, Section, Angle Section, T, I, C, L Section etc. Grades of steel and strength characteristics; advantages and disadvantages of steel as construction material; Use of steel table and relevant I. S. code; Types of loads on steel structure and its I. S. code specification.

#### UNIT - II

**Connections:** Riveted connections, Types of rivets and their use, Nominal dia, Gross dia. Unwin's formula, Pitch of rivets, Edge distance, Tacking rivets, permissible stress in rivet riveted joint and its failure, Strength of riveted joint and efficiency of a riveted joint. Assumptions in theory of riveted joint, Design of riveted joint for axially loaded member, Eccentric riveted connection Welded connection Introduction Permissi stress in weld, strength of weld, advantages and disadvantages of welded joint. Types of weld and their symbols Design of fillet weld and butt weld subject to axial load

#### UNIT - III

**Tension member:** Types of Sections used, Permissible Stresses in Axial Tension, gross and net cross sectional area of tension member, Analysis and Design of tension member with welded and riveted connection

**Compression Member:** Criteria of failure of short column and long column, end conditions effective length of a column, slenderness ratio and corresponding compressive stress : Angle struts Types of sections used, Analysis and Design of axially loaded angles truts with weld and riveted connection. Stanchion and Columns, types of sections used, simple and built up sections. Analysis and design of axially loaded column, Design of compound column. Design of lacing angles and Batten plates.

#### UNIT –IV

**Column Bases:** Types of column bases, design of slab base & concrete block. Cleat angles, their use, introduction to gusseted base (numerical problems Gusseted Base)

**Steel Beams:** Different steel sections used; Simple and built-up sections Permissible bending stresses. Design of simple beams, check for shear only. Design of built-up beams (Symmetrical I Section with cover plates only), check for shear only, bending, bearing and deflection. **Introduction to Plate Girder:** Various components and Their functions. (numerical Problem on Plate Girder)

#### UNIT - V

**Roof Truss:** Types of steel roof truss & its selection criteria span and slope, Rise and pitch, loads acting on the Roof. Dead load, Live load and wind load as per I.S.875-1987. Combination of loads for design of truss, Forces in the members (Graphical method). Design of members of truss, Design of Angle purlin as per I.S.06 16 .Arrangement of Members. **Timber Structures:** Grades of Timber–stress in timber Factors affecting stress/strength of timber. Design of Timber column & Timber Beam

#### Course Outcome:

CO1 Understand the section used in steel structure.

CO2 Analysis of connection in steel structure

CO3 Analysis of tension member and compression member

CO4 Analysis of column bases of steel structure.

CO5 Analysis of roof trusses.

#### Reference Books:

S.No.	Title	Author
1	Steel structures	By Ramanatham
2.	Structural Engg.Vol.-IV (Steel)	By Vazirani
3	Steel Structures	By Ramchandra
4	Steel Structures	By Arya and Ajmani
5	Steel Structures	By Malhotra M.M.
6.	I.S.Code 800-1984	
7.	Steel Structures	By R.K.Dhoble & D.S. Dharmadhikari
8.	Steel Structures	Negg.



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## DCE061P ENVIRONMENTAL ENGINEERING LAB

### List of Experiment:

1. Turbidity test.
2. Colour test.
3. Test for PH, Hardness, Chlorides, Iron & manganese.
4. Test for B-Coil.
5. Test for residual chlorine.
6. Test for total, volatile, fixed suspended and settleable.
7. Test for D.O ,B.O.D. ,C.O.D .and stability.
8. To determine suspended solids, dissolved solids and total solids of waste water sample.
9. Design the Septic Tank for the public building such as hostel or hospital. Draw Plan and Section of the same along with the drainage arrangement in soak pit.

### VISITS:

1. Intake site and adjoining pumping station.
2. Water treatment plant and testing lab.
3. Sewage treatment plant

### Reference Books:

Sr. no	Title	author	publish
1	Environmental Engineering Lab manual	A.K. JAIN	Khanna publication
2	Handbook of environmental Engineering 2 <sup>nd</sup> edition	Myer kutz	Willy publication
3	Enviromental engineering	M.R. GIDDE R.K. LAD	Nirali publication
4	Enviromental engineering Lab Manual	N.n basak	Mc Graw hill



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## DCE062P QUANTITY SURVEYING & COSTING-II

### List of Experiment:

1. Use of different Schedule of Rates like. PWD. C.P.W.D., D.S.R., RES, Housing board, Irrigation & PHE
2. Estimating & abstract and rate analysis with the help of different software eg. QE-PRO, ESTIMATOR, & Print out of report.
3. Taking out quantities of following items for small R.C.C. Hall  
Concreting for footing, Column, Beam, slab. Reinforcement for above items by preparing Schedule of bars, Form work for all above items
4. Preparing Rate analysis of following items:  
Building work–Brick work, P.C.C., R.C.C .,Plastering, Flooring, Doors, Windows
5. Taking out quantities of Steel work for given shed supported on steel
6. trusses& having GI sheet/profile sheet roofing.
7. Taking out quantities of work for pipe culvert.
8. Drawings shall be provided for the above exercise by subject teacher.

All experiment works calculation are calculated in MS office / Execl

### References Books:

Sr. No	Title	Authors	Publish
1	Quantity surveying and valuation	S.p mahajan	Satya publication
2	Quantity surveying, contracts and tenders	G.r Deshpandey	Nirali publication
3	Quantity survey and valuation lab manual	Amit khanna	Eagale publication
4	Quantity survey and valuation	Rahul khanna	



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## DCE063P STRUCTURAL DESIGN & DRAFTING-II (STEEL) LAB

### List of Experiment:

Term work shall consist of sketch book and design report of steel roof truss for an industrial building. Sketchbook shall consist of any five plates out of the below mentioned

1. Typical sketches of sections of tension member, determination of net effective cross-sectional area of tension member for angle section
2. Typical sketches of sections of compression member, lacing and battening.
3. Graphical solution of frame stress in the member Type of trusses for different spans.
4. Working drawing of steel truss with the details of joint.
5. Detailed drawing of slab base and gusseted base.

Important information of clauses of IS800-1984 and IS875 (Part-1,2,3)

### Reference Books:

S. NO	TITLE	AUTHOR	PUBLISH
1	Steel structures	By Ramanatham	
2	Structural Engg. Vol.-IV (Steel)	By Vazirani	
3	Steel Structures	By Malhotra M.M.	
4	I.S.Code800-1984		



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## DCE064P NON DISTRACTIVE TESTING LAB

### LIST OF EXPERIMENT

1. Ultrasonic testing (UT): Uses high-frequency sound waves to detect flaws and measure dimensions
2. Radiographic testing (RT): Uses film or a digital detector to create images that can be examined for damage or flaws
3. Magnetic particle testing (MT): Uses magnetic particles to detect flaws in magnetizable materials
4. Liquid penetrant testing (PT): Applies a coating of liquid with a fluorescent or visible dye to an asset
5. Visual testing (VT): A conventional NDT technique
6. Acoustic emission testing (AE): Uses acoustic energy bursts to identify potential defects
7. Eddy current (electromagnetic) testing (ET): A type of NDT testing
8. Leak testing (LT): A type of NDT testing

### Reference Books:

SRNO	TITLE	AUTHOR	PUBLISH
1	NDT HAND BOOKS	SURESH KUMAR NEERAJ KUMAR MAHESH G	
2	BASICS OF NDT	LARRY AND KUMAR	
3	NDT TESTING	M.KANHAN A. PRADEEP	
4	NDT TESTING	BY S. RAMCHANDRAN	



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## DCE065P MAJOR PROJECT

### Course Contents

1. **Introduction:** Importance of project work, guideline and general introduction
2. **Selection of Project:** The project can be selected from any four civil engineering system like Building construction system, transportation Engineering system, irrigation engineering system, Atopic for project can also be selected on recent development in civil engineering.
3. **Planning of project:** Planning of field work, line of action, work distribution, data to be collected by different batches. projects to be undertaken by a group of 4 to 6 students.
4. **The project report shall be in the following format:**
  - Topic and objectives
  - Collection of data ,required survey work,
  - Management and construction procedure
  - Resources scheduling and networking
  - Design details
  - Required drawing set
  - Utility to society fany
  - Conclusion

### LIST OF CIVIL ENGINEERING PROJECTS:

1. Design of Check Dam/Stop Dam.
2. Study of G Dam(Earthen/Gravity)
3. Micro irrigation–Drip/Sprinkler Irrigation.
4. Junction planning for city roads/planning for roads for congested area/parking
5. Studies etc.
6. Rain water harvesting for domestic or public building.
7. Campus development.
8. Interior decoration.
9. Concrete mix design.
10. Solid waste management.
11. Hospital waste disposal.
12. Recycling of resources.
13. Manufacturing of Precast concrete products.
14. Prestressed concrete.

15. Planning Estimating and design for residential apartments/commercial complex.
16. Planning and design of water treatment plant for given data.
17. Planning and design of water supply scheme for given layout.
18. Planning and design of sewage treatment plant for given data.
19. Planning and design of sanitary scheme for given layout.
20. Intelligent & green building material.

**Term Work:** Shall consist of Detailed project report in above format. Separate drawing sheets covering details of the project shall also be prepared