

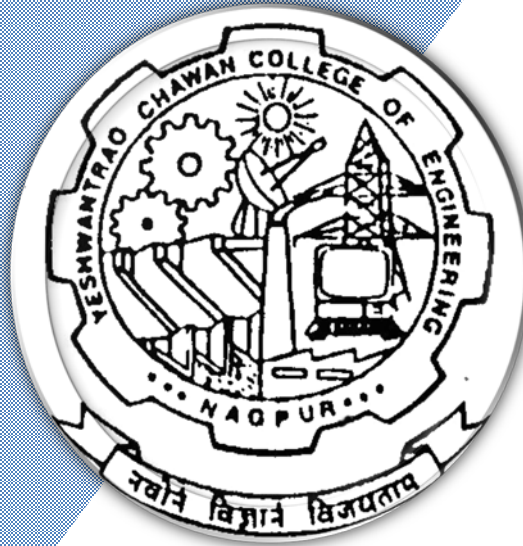
Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

(Accredited 'A++' Grade by NAAC with a score of 3.25)

Hingna Road, Wanadongri, Nagpur - 441 110



Master of Technology SoE & Syllabus 2022

(Department of Civil Engineering)

M.Tech in Environmental Engineering



M.TECH. SCHEME OF EXAMINATION 2022
M.Tech. in Environmental Engineering

SN	Sem	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage		ESE Duration Hours
					L	T	P	Hrs		TA**	ESE	
I SEMESTER												
1	1	22ENV101	Energy Conversion & Environment	T	3	0	0	3	3	20	80	3
2	1	22ENV102	Water Supply & Waste Water Collection System	T	3	0	0	3	3	20	80	3
3	1	22ENV103	Lab : Water Supply & Waste Water Collection System	P	0	0	2	2	1	40	60	-
4	1	22ENV104	Municipal Water Treatment	T	3	0	0	3	3	20	80	3
5	1	22ENV105	Municipal Solid Waste Management	P	3	0	0	3	3	20	80	3
6	1	22ENV106	Municipal Waste Water Treatment	T	3	0	0	3	3	20	80	3
7	1	22ENV107	Lab : Water & Waste Water Analysis	T	0	0	2	2	1	40	60	-
Total					15	0	4	19	17			

II SEMESTER												
1	2	22ENV201	Industrial Waste Water Treatment & Reuse	T	3	0	0	3	3	20	80	3
2	2	22ENV202	Environmental Management	T	3	0	0	3	3	20	80	3
3	2	22ENV203	Air Quality Management	T	3	0	0	3	3	20	80	3
4	2	22ENV204	Rural Water Supply and Sanitation	T	3	0	0	3	3	20	80	3
5	2		Professional Elective-I	T	3	0	0	3	3	20	80	3
6	2		Professional Elective-II	T	3	0	0	3	3	20	80	3
7	2	22ENV205	Seminar	P	0	0	2	2	1	40	60	-
Total					18	0	2	20	19			

Professional Elective - I

1	2	22ENV211	PE I : Hazardous Waste Management
2	2	22ENV212	PE I : Water Resource Management
3	2	22ENV213	PE I : Environmental Biotechnology
4	2	22ENV214	PE I : Advanced Water Treatment

Professional Elective - II

1	2	22ENV221	PE II : Environmental Legislations
2	2	22ENV222	PE II : Applied Structure
3	2	22ENV223	PE II : Water Reuse and Recycling

III SEMESTER												
1	3	22ENV301	Project Phase-I	P	0	0	16	16	8	60	40	-
Total					0	0	16	16	8			

IV SEMESTER												
1	4	22ENV401	Project Phase-II	P	0	0	24	24	12	60	40	-
Total					0	0	24	24	12			

GRAND TOTAL											56	
--------------------	--	--	--	--	--	--	--	--	--	--	-----------	--

		June, 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

I Semester

22ENV101– Energy Conversion & Environment

Course Outcomes :

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

1. Explain different sustainable energy sources
2. Analyze energy management and importance of energy conversion.
3. Recommend different energy conversion method.
4. Select modern technologies of Waste to Energy conversion

UNIT:1	Significance of Energy Conversion and Environment	07 Hrs
Overview of Global and Indian Energy Scenario; Environmental Impacts of Energy Conversion, Principles of Waste Minimization and Energy Recovery. (Contemporary issues related to topic)		
UNIT:2	Renewable and Non-Renewable Energy Sources	06 Hrs
Energy Conversion Methods: solar, wind, tidal and geothermal with their principles and application, Estimation of Potential of Energy Recovery from various Sources, Energy economics (Contemporary issues related to topic)		
UNIT:3	Waste to Energy options	07 Hrs
Physical, thermochemical and bio chemical processes, Combustion, Gasification, pyrolysis; Anaerobic digestion, Biogas Technology, Future Technologies for Waste to Energy Systems. Contemporary Issues- CNG & Biodiesel (Contemporary issues related to topic)		
UNIT:4	Other Energy options	06 Hrs
Introduction to Microbial Fuel cell, Gas generations and collection in landfills, Measurements and Control; Energy and Resources Conservation Strategies and Policies. (Contemporary issues related to topic)		
UNIT:5	Energy Checks	07 Hrs
Environmental Appraisal, Energy audit, Carbon Foot prints, Sustainable Energy-Efficient systems, Case studies of sustainable Energy Projects. (Contemporary issues related to topic)		
UNIT:6	Green Building & material	06 Hrs
Intelligent Green Building, Green Rating Systems, Alternative Construction Materials & methods Testing and Verification. Contemporary Issues- Green Audit (Contemporary issues related to topic)		
Total Lecture		39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-1



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Text Books

1	D.O. Hall, G. W. Barnard and P.A. Moss, Biomass for Energy in the Developing Countries, Current Roles, Potentials, Problems, Prospects, Pergamon Press Ltd, 1st edition.
2	W. C. Turner, Energy Management Handbook Wiley New York 1st edition.
3	P. Meier, Energy System Analysis for Developing countries, Springer Verlag 1st edition.
4	Dorthy J De Renzo, Energy from Bioconversion of Waste materials, Noyes data Corporation USA 1st edition.

Reference Books

1	G.D. Rai, Non-Conventional Energy Source, Standard Publishers Distributors.
2	Fowler J. M. Energy and the Environment McGraw Hill New York 2nd edition.
3	B.H. Khan, Non-Conventional Energy Resources, 2nd Edition, McGraw Hill Companies.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1	https://www.springer.com/series/15901
2	https://www.springer.com/series/15433
3	https://www.springer.com/series/8059
4	https://link.springer.com/book/10.1007/978-3-030-76221-6

MOOCs Links and additional reading, learning, video material

1	https://onlinecourses.nptel.ac.in/noc22_me98/preview
2	https://onlinecourses.nptel.ac.in/noc22_me104/preview
3	https://onlinecourses.nptel.ac.in/noc22_hs105/preview
4	https://onlinecourses.swayam2.ac.in/nou22_ge71/preview
5	https://onlinecourses.swayam2.ac.in/nou22_me10/preview
6	https://onlinecourses.nptel.ac.in/noc22_ch38/preview

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-2



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

I Semester

22ENV102– Water Supply & Waste Water Collection System

Course Outcomes :

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

1. Understand fundamental of design of the pipe in water distribution system and wastewater collection system
2. Understand different methods of analysis of pipe network for water distribution.
3. Design of water distribution system and sewerage system

UNIT:1	Water Supply Principle	07 Hrs
Analysis of Water Supply System Components of water Supply system, Water use and demand estimation Flow through pipes- Continuity principle, and energy principle, Equation for flow through pipes, Moody diagram, Maintenance of distribution System, Water hammer Analysis. (Contemporary issues related to topic)		
UNIT:2	Pipe Network Method	06 Hrs
Analysis of Water Distribution System Analysis of flow through pipe network through various method such as 1. Hardy cross method 2. Newton Raphson's method 3. Linear Theory method (Contemporary issues related to topic)		
UNIT:3	Pumps and Valves	07 Hrs
Types of Reservoirs and design parameter, Importance and design of pumps and different valves in the distribution system, Node flow analysis (Contemporary issues related to topic)		
UNIT:4	Design of Distribution Network	06 Hrs
Design of Rising Main, Critical path method for design of water distribution networks and its cost analysis (Contemporary issues related to topic)		
UNIT:5	Wastewater Collection System	07 Hrs
Objectives, types of system and sewers, requisites for sewerage system design – survey and investigations. Hydraulics of sewer – flow equations, pipe and open channel flow, self-cleansing and scouring velocities through sewer, flow in partially filled sewers, velocity of equal cleansing, sewer shape vis-a-vis their usefulness, sewer invert drop (Contemporary issues related to topic)		
UNIT:6	Design of Wastewater Collection System	06 Hrs
Combined, and semi-combined sewers Sewer Pipe hydraulics: size and design of pipes, Manholes, street inlets, catch basins, sewer junctions, inverted siphon, flushing tanks, air ejectors (Contemporary issues related to topic)		
Total Lecture		39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)


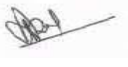
M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

**SoE No.
22ENV-101**

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-4



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Text Books

1	Bhave P. R. And Gupta R, Analysis of Water Distribution Networks, Narosa Publishing Co., New Delhi (2006)
2	Fair G. M., Geyer J. C. & Okun D. A., Water & Wastewater Engg. Vol.I & II, John-Wiley & Sons, New York, 2015
3	Bhave P.R, Optimal design of water distribution networks, Narosa Publishing Co., New Delhi (2003)

Reference Books

1	CPHEEO, Manual on water supply and treatment, Ministry of urban development, GoI
2	CPHEEO, Manual on Sewerage and Sewage Treatment, Ministry of urban development, GoI

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1	https://www.springer.com/series/15901
2	https://link.springer.com/book/10.1007/978-3-030-76221-6

MOOCs Links and additional reading, learning, video material

1	https://archive.nptel.ac.in/courses/105/105/105105201/
2	https://www.youtube.com/watch?v=5NzMt6PErYo

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-5



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

**SoE No.
22ENV-101**

I Semester

22ENV103– Lab. : Water Supply & Waste Water Collection System

Course Outcomes :

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

1. Understand the fundamentals of the design of the pipe in the water distribution system and wastewater collection system
2. Design and analysis of pipe networks for water distribution using different methods
3. Design and analysis of water distribution system for continuous and Intermitted Systems

Following assignments in the field of

1. Water Distribution system and its design by WaterGEMS
2. Design of sewerage system
3. Analysis of water distribution
4. Cost Benefit Analysis

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-6



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

I Semester

22ENV104– Municipal Water Treatment

Course Outcomes :

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

1. Comprehend the fundamentals related to water treatment
2. Design different water treatment Units.

Unit:1 Introduction of Water Treatment

6 Hours

Water quality criteria and standards, Requirement of water treatment facilities, Unit operation & Unit process, Process selection.

Aeration: Objective, Principles, Types of aerators, Design of aerators.

(Contemporary issues related to topic)

Unit:2 Physio-chemical treatment

7 Hours

Coagulation: History, need of coagulation, Chemistry of coagulation, Various coagulants used in process, Factors affecting efficiency of coagulation process, Operation of feeders, Types of rapid mixing devices, design of flash mixer. Flocculation: Theory of flocculation, Slow mixing devices.

(Contemporary issues related to topic)

Unit:3 Sedimentation

6 Hours

Principle, Stoke' law, working of ideal sedimentation tank, Types of sedimentation tank, Design and working of clariflocculator, Operational problems in sedimentation tank.

(Contemporary issues related to topic)

Unit:4 Filtration

7 Hours

Theory of filtration, Types of filters, working of slow and rapid sand filter, operational difficulties and design of rapid sand filter.

(Contemporary issues related to topic)

Unit:5 Disinfection

6 Hours

Methods of disinfection, Kinetics of chemical disinfection, Chlorination, Chemistry of chlorination, Methods of chlorination.

(Contemporary issues related to topic)

Unit :6 Advanced treatment

7 Hours

Adsorption: Theory, Granular and powder activated carbon, Performance and reactivation. Adsorption of organic compounds. Defluorination, Ion Exchange, Materials and reactions, Kinetics, Applications.

(Contemporary issues related to topic)

Total Lecture 39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-7



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Text Books

- | | |
|---|---|
| 1 | N.J. McGhee, Steel E.W., Water Supply and Sewerage, McGraw hill 1991. |
| 2 | P.N. Modi, Water Supply Engineering: v. 1, by Standard Book House, 2010 |

Reference Books

- | | |
|---|--|
| 1 | CPHEEO, Manual on Water supply and Treatment, Govt. of India Publication |
|---|--|

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

- | | |
|---|---|
| 1 | http://103.152.199.179/YCCE/Supported%20file/Supprted%20file/e-copies%20of%20books/Civil%20Engineering/7.%20Water_and_Waste_Water_Engineering.pdf |
|---|---|

MOOCs Links and additional reading, learning, video material

- | | |
|---|---|
| 1 | https://nptel.ac.in/courses/105107207 |
|---|---|

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-8



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

I Semester

22ENV105– Municipal Solid Waste Management

Course Outcomes :

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

1. Understand different characteristic of solid waste.
2. Understand different methods of collection, transfer and transport of solid waste.
3. Understand different Processing and disposal methods for solid waste

UNIT:1	Solid waste Management Status	07 Hrs
Problems and impacts of solid waste in developing countries, Solid waste management and organization. Sources, Types, Quantity and Composition of municipal solid waste. (Contemporary issues related to topic)		
UNIT:2	Characterization of solid waste	06 Hrs
Functional Elements of MSW, Characteristics of solid waste–Sampling–physical, chemical, and biological Analysis. (Contemporary issues related to topic)		
UNIT:3	Storage, Collection & transportation of waste	07 Hrs
Storage of solid waste, Collection of waste, Transportation, Optimization of route, Tools and equipment, Transfer station, Volume reduction (Contemporary issues related to topic)		
UNIT:4	Biological Processing of solid waste	06 Hrs
Composting – Process microbiology, Aerobic and anaerobic composting, digestion. Sanitary Landfill – Process, mechanism, Classification, types, site considerations, Maintenance of site. (Contemporary issues related to topic)		
UNIT:5	Thermochemical Processing of solid waste	07 Hrs
Processing method, Incineration- Mechanism, types, and Operation, Mechanical Composting, Pyrolysis, Refuse derived fuel (Contemporary issues related to topic)		
UNIT:6	MSW Rules & regulations	06 Hrs
Legislation on Management and Handling of Municipal Solid Waste Management, Handling of Bio-Medical Waste (Contemporary issues related to topic)		
Total Lecture		39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-9



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Text Books

1	Solid waste management in developing countries – A.D. Bhide, B.B. Sudresan
2	George Tchobanoglous, "Integrated Solid Waste Management", McGraw-Hill Publication, 1993
3	Bhave P.R, Optimal design of water distribution networks, Narosa Publishing Co., New Delhi (2003

Reference Books

1	Municipal Refuse Disposal – Institute of America Public Health Association, Interstate printer and publisher
2	CPHEEO manual on MSW, GoI, New Delhi

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1	https://www.springer.com/series/15901
2	https://link.springer.com/book/10.1007/978-3-030-76221-6

MOOCs Links and additional reading, learning, video material

1	https://nptel.ac.in/courses/105103205
2	https://archive.nptel.ac.in/courses/120/108/120108005/

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-10



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

I Semester

22ENV106– Municipal Waste Water Treatment

Course Outcomes :

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

1. Understand basics of different wastewater treatment processes
2. Understand working of different sewage treatment units
3. Design different sewage treatment units.
4. Understand different methods of treatment and disposal of biosolids

UNIT:1	Introduction	07 Hrs
General objectives of sewage treatment, sewage characteristics, Reactor types and their hydraulic characteristics, mass balance analysis, reaction order, rates and coefficients. (Contemporary issues related to topic)		
UNIT:2	Preliminary & Primary treatment	06 Hrs
Conventional sewage treatment flow sheet, functions of different unit processes. Physical treatment: screening, gravity separation theory, types of settling, grit removal, primary sedimentation tank and its design (Contemporary issues related to topic)		
UNIT:3	Chemical Treatment	07 Hrs
Chemical Treatment: chemical coagulation and precipitation, removal of phosphorus, heavy metals (Contemporary issues related to topic)		
UNIT:4	Biological treatment-I	06 Hrs
Biological treatment: Fundamentals, basic terminologies Activated sludge process: process description, recent developments, process analysis, design of conventional activated sludge process unit. (Contemporary issues related to topic)		
UNIT:5	Biological treatment-II	07 Hrs
Denitrification, Biological phosphorous removal, Membrane Bio-Reactors (Contemporary issues related to topic)		
UNIT:6	Treatment of biosolids	06 Hrs
Treatment of biosolids: process flow diagram, thickening, aerobic and anaerobic digestion, conditioning, dewatering (Contemporary issues related to topic)		

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-11



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022


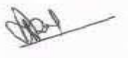
(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

**SoE No.
22ENV-101**

Total Lecture | 39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-12



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Text Books

1	S.J. Arceivala, Wastewater Treatment and Disposal, Marcel Dekker, 1981.
2	Metcalf and Eddy, Wastewater Engineering, Treatment, Disposal and Reuse, Inc. Third edition McGraw – hill 1991
3	Qasim S.R. Wastewater Treatment Plant Planning, Design and Operation, Holt, Rinehart and Winston, N.Y

Reference Books

1	N.F. Grey Activated Sludge Process, Theory and Practices, Oxford University Press
---	---

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1	https://www.springer.com/series/15901
2	https://link.springer.com/book/10.1007/978-3-030-76221-6

MOOCs Links and additional reading, learning, video material

1	https://onlinecourses.nptel.ac.in/noc22_ce27/preview
2	https://www.digimat.in/nptel/courses/video/105105178/L23.html

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-13



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

I Semester

22ENV107– Lab : Water & Waste Water Analysis

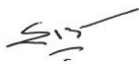
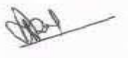
Course Outcomes :

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

1. Understand the importance of water quality standards.
2. Perform various physical and chemical tests on the water sample.
3. Understand various biological tests performed on water samples and to perform a few biological tests on water

Any TEN experiments of the following will be performed.

1. To determine Alkalinity of a water sample.
2. To determine Available Chlorine in given bleaching powder sample
3. To determine Total, Calcium and Magnesium hardness of given water sample.
4. To determine Dissolved Oxygen concentration in given water sample.
5. To determine Sulphates concentration in given water sample.
6. To determine Biochemical Oxygen Demand (B.O.D.) of a wastewater sample.
7. To determine Chemical Oxygen Demand (C.O.D.) of a wastewater sample.
8. To determine Maximum Probable Number (MPN) of coli form bacteria present in water sample by Multiple Tube Dilution (MTD) technique-presumptive test.
9. To determine Density of bacteria in a water sample pour plate (Standard Plate Count) method.
10. To determine concentration of Chlorides in a given water sample.
11. To determine Hydrogen ion concentration (pH) of a solution
12. To determine Turbidity of a solution using Nepheloturbidimeter.
13. To determine optimum coagulant dose by Jar test.
14. To determine effective size and co-efficient of uniformity of a given sand sample and to separate required sand from given stack of sand for required effective size and coefficient of uniformity.
15. To determine total, dissolved and suspended solids in given water sample.

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-14



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

II Semester

22ENV201– Industrial Waste Water Treatment & Reuse

Course Outcomes:

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

1. Understand Importance of Industrial Wastewater Treatment.
2. Understand The Fundamentals of Various Treatment Processes.
3. Understand Treatment Methodologies for Various Industrial Wastewaters.
4. Design Various Treatment Units for Industrial Wastewater

UNIT:1	Introduction	07 Hrs
Environmental impact due to industrial water pollution, problems associated with industrial wastewater, and characterization of industrial wastewater. Sampling and analysis of wastewater, toxicity testing, statistical analysis of data, Indian standards for waste disposal (Contemporary issues related to topic)		
UNIT:2	Recycle and Reuse of Wastewater	06 Hrs
Common effluent treatment plant. Recycle and reuse of industrial waste, volume and strength reduction, concept of zero liquid discharge (Contemporary issues related to topic)		
UNIT:3	Preliminary Treatment Unit	07 Hrs
Equalization and proportioning of wastewater, design of equalization tank. Neutralization of wastewater, Oil and grease removal, Floatation (Contemporary issues related to topic)		
UNIT:4	Biological Treatment: Ponds	06 Hrs
Stabilization pond, oxidation ponds. (Contemporary issues related to topic)		
UNIT:5	Anaerobic Treatment	07 Hrs
Anaerobic treatment, UASB, attached growth processes (Contemporary issues related to topic)		
UNIT:6	Treatment of Industrial Wastewater	06 Hrs
Treatment of specific industrial wastes: textile, dairy, tanning, sugar, brewery and distillery, iron and steel, food industries. (Contemporary issues related to topic)		
Total Lecture		39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-15



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)


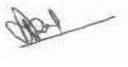
M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

**SoE No.
22ENV-101**

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-16



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Text Books

1	Metcalf and Eddy, Wastewater Engineering, Treatment, Disposal and Reuse, Inc. Third Edition McGraw Hill 1991
2	W.W. Eckenfelder, Industrial Pollution Control, McGraw Hill Int. Edition 1990
3	W.J. Weber, Physicochemical Processes for Water Quality Control, John Wiley and Sons, 1972.
4	Nemerow, N.L. Theories and Practices of Industrial Waste Treatment. New York: Addison Wisely
5	Arceivala, S.J., (1998) "Wastewater Treatment for Pollution Control ", Tata McGraw Hill

Reference Books

1	Central pollution control board, India, comprehensive industry document series
2	World Bank Group (1998) "Pollution Prevention and Abatement Handbook – Towards Cleaner Production", World Bank and UNEP, Washington D.C

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1	https://www.springer.com/series/8059
2	https://link.springer.com/book/10.1007/978-3-030-76221-6

MOOCs Links and additional reading, learning, video material

1	https://nptel.ac.in/courses/105106119
2	https://nptel.ac.in/courses/105105048

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-17



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

II Semester

22ENV202– Environmental Management

Course Outcomes :

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

1. Understand fundamentals and identify the tools used for Environmental Management
2. Understand environmental impact assessment (EIA) as an environmental management tool
3. Understand the evolution of environmental policies and laws and implications of international policies and laws for India

UNIT:1	Sustainable Development	07 Hrs
Development and Environment, Global and Indian scenario. National Environmental Policy, Environmental organizations for planning and implementation sustainable development. Concept of carrying capacity, assimilative and supportive capacity (Contemporary issues related to topic)		
UNIT:2	Impact Identification	06 Hrs
Preventive and reactive strategies for environmental pollution control, Nature of impact – primary, secondary, tertiary, short –term long-term, local and regional, reversible & irreversible impacts (Contemporary issues related to topic)		
UNIT:3	Environmental Impact Assessment	07 Hrs
Environmental impact Assessment: Screening scoping, Methodologies: Adhoc, check-lists, network, matrix etc. Environmental Management plan. EIS Typical case studies (various sectors) of environmental impact assessment. MoEF questionnaire for environmental clearance, Disaster management plan (Contemporary issues related to topic)		
UNIT:4	Environmental Audit	06 Hrs
Environmental Audit definition, concept of EA, types of environmental audit, audit scope, procedural aspects of conducting environmental audit, water audit, wastewater audit, health and safety audit (Contemporary issues related to topic)		
UNIT:5	Environmental Management system	07 Hrs
Eco Labeling, Concept of Cleaner Technology, Life Cycle Assessment, waste minimization, I SO 14001. (Contemporary issues related to topic)		
UNIT:6	Environmental Legislations	06 Hrs
Environmental Legislations and its basic concepts, critical issues, civil liability, various enactment, and their provisions – Water Act (1974, 1988), forest Conservation Act (1980), Air Act (1981, 1988), Water (Cess) Act 1977, Environmental Protection Act 1986, other major environmental acts/rules. (Contemporary issues related to topic)		
Total Lecture		39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-18



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)


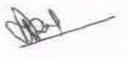
M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

**SoE No.
22ENV-101**

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-19



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Text Books

1	Anand Bal, An Introduction to Environmental Management, Himalaya Publishing House., 2009
2	W. C. Turner, Energy Management Handbook Wiley New york 1st edition.

Reference Books

1	John Rau & Wooten, Environmental Impact Assessment, Mc Graw Hill., 4th Edition, McGraw Hill Education, 2012
2	Harry W. Gehm, Jacob I. Bregman, a handbook on pollution Control Acts, Central Pollution Control Board, New Delhi, 2015
3	R.K. Sapra, S. Bhardwaj, the New Environmental Age, Ashish Pub. House, New Delhi. 2011.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1	https://www.springer.com/series/15901
2	https://www.springer.com/series/15433
3	https://www.springer.com/series/8059
4	https://link.springer.com/book/10.1007/978-3-030-76221-6

MOOCs Links and additional reading, learning, video material

1	https://nptel.ac.in/courses/114106017
2	https://onlinecourses.nptel.ac.in/noc21_hs83/preview

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-20



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

II Semester

22ENV203– Air Quality Management

Course Outcomes :

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

1. Understand Air Pollution and Its Control
2. Understand Various Meteorological Factors and Its Influence on Air Pollution.
3. Understand The Basic Principles, Equipment, And Methods Used to Control Particulate Matter, Gaseous Emission and Automobile Emission
4. Understand Basics of Urban Air Pollution, Odour and Noise Pollution

Unit:1 Sources And Effects of Air Pollutants

6 Hours

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.

(Contemporary issues related to topic)

Unit:2 Dispersion Of Pollutants

7 Hours

Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

(Contemporary issues related to topic)

Unit:3 Air Pollution Control

6 Hours

Principles of control equipment – Particulates control by gravitation, centrifugal method, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries

(Contemporary issues related to topic)

Unit:4 Air Quality Management

7 Hours

Air quality standards – Air quality monitoring Analysis – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality

(Contemporary issues related to topic)

Unit:5 Indoor And Ambient Air Quality

6 Hours

Indoor air pollution: Causes of air pollution, sources and effects of indoor air pollutants, changes in indoor air quality, control of indoor air pollutants and air cleaning systems. Air pollution Index.

(Contemporary issues related to topic)

Unit :6 Urban Air Pollution

7 Hours

Air Pollution from vehicles; Air Pollution from Biomass burning; Air Pollution from landfills Noise pollution: Theory, sources, measurement, and methods of control of noise pollution. Odour pollution: Theory, sources, measurement and methods of control of odour pollution

(Contemporary issues related to topic)

Total Lecture 39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-21



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Text Books

1	M.N. Rao ,Air Pollution,Tata McGraw Hill, 2006
2	C. S. Rao, Air pollution control technologies
3	Anjaneyulu
4	Noel D Nevers

Reference Books

1	Air Pollution, Vol. I to IX, A. C. Stern, Academic, New York, 1968
---	--

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1	-----
---	-------

MOOCs Links and additional reading, learning, video material

1	https://nptel.ac.in/courses/105107213
---	---

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-22



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

II Semester

22ENV203– Air Quality Management

Course Outcomes :

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

1. Understand the knowledge regarding rural water supply and sanitation scheme.
2. Understand different compact units of rural water treatment and supply.
3. Comprehend simple wastewater treatment for rural water supply.

UNIT:1	Introduction	07 Hrs
Concept of environmental and scope of sanitation in rural areas. Magnitude of problem of water supply and sanitation, National policy. (Contemporary issues related to topic)		
UNIT:2	Planning of water supply systems	06 Hrs
Various approaches for planning of water supply systems in rural areas. Selection and development of preferred sources of water, springs, wells, Infiltration wells, radial wells, and infiltration galleries (Contemporary issues related to topic)		
UNIT:3	Collection of water	07 Hrs
Collection of raw water from surface source. Specific problems in rural water supply and treatment e.g. iron, manganese, fluorides, Low cost treatment (Contemporary issues related to topic)		
UNIT:4	Treatment	06 Hrs
Improved methods and compact system of treatment of surface and ground waters such as MB settlers, slow sand filter, chlorine diffusion cartridges. Water supply through spot sources, hand pumps, open dug wells Planning of distribution system in rural areas Water supply during fairs, festivals and emergencies, (Contemporary issues related to topic)		
UNIT:5	Sanitation	07 Hrs
Treatment and disposal of wastewater/sewage various methods of collection and Disposal of night soil Onsite sanitation system and community latrines, low cost sanitation methods. (Contemporary issues related to topic)		
UNIT:6	Rural waste management	06 Hrs
Simple wastewater treatment system for rural areas and small communities such as stabilization ponds, septic tank and soakage pits, Disposal of solids waste: Composting and Biogas plants. (Contemporary issues related to topic)		
Total Lecture		39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-23



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Text books

- | | |
|---|---|
| 1 | Wagner, E.G. and Lanoik, J.N., Water supply for Rural areas and small communities, Geneva |
|---|---|

Reference Books

- | | |
|---|--|
| 1 | Manual of water supply and treatment, 3rd Edition, CPHEEO, GOI, New Delhi |
| 2 | Low cost on site sanitation option, Hoffman and Heijno Occasional Nov.1981 Paper No.21 P.O. Box 5500 2280 HM Rijswijk, the Netherlands offices, J.C.Monkeniaan, 5Rijswijk(The Haque) |
| 3 | R.K. Sapra, S. Bhardwaj, the New Environmental Age, Ashish Pub. House, New Delhi. 2011. |
| 4 | Manual of Swachh Bharat Mission, |

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

- | | |
|---|---|
| 1 | https://www.springer.com/series/15433 |
| 2 | https://www.springer.com/series/8059 |
| 3 | https://link.springer.com/book/10.1007/978-3-030-76221-6 |

MOOCs Links and additional reading, learning, video material

- | | |
|---|---|
| 1 | https://nptel.ac.in/courses/105101215 |
| 2 | https://jalshaktiddws.gov.in/sites/default/files/Manual_for_Operation_and_Maintenance_of_Rural_Water_Supply_Scheme.pdf |

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-24



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

II Semester

22ENV211– PE I : Hazardous Waste Management

Course Outcomes :

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

1. Understand Principle of Methods Given to Hazardous Waste.
2. Understand the Common Functional Elements of Waste Management System
3. Suggest Suitable Waste Processing Technologies and Disposal Methods

UNIT:1	Introduction	07 Hrs
Definition of hazardous waste, U.S.E.P.A. classification, global scenario, episodes. (Contemporary issues related to topic)		
UNIT:2	Source of hazardous waste	06 Hrs
Source of hazardous waste, effect of Hazardous waste on human health, Sampling and analytical procedures, Overview of treatment and disposal method – waste minimization (Contemporary issues related to topic)		
UNIT:3	Treatment of Hazardous Waste-I	07 Hrs
Physicochemical method and biological method, Thermal Processes. In-situ methods for Decontamination of hazardous waste sites (Contemporary issues related to topic)		
UNIT:4	Treatment of Hazardous Waste-II	06 Hrs
Solidification/stabilization and innovation techniques. (Contemporary issues related to topic)		
UNIT:5	Disposal	07 Hrs
Secure landfill. Site selection methodology for establishing treatment and disposal methods and EIRA methodology. (Contemporary issues related to topic)		
UNIT:6	Legislations	06 Hrs
Legislation on Management & Handling rules based on Hazardous Waste Management. Hazardous waste (management and handling) rules, 1989 and Indian Scenario. Common hazardous waste treatment Storage and disposal facility (CHWTSDF) , Conventions (Contemporary issues related to topic)		
Total Lecture		39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-25



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

**SoE No.
22ENV-101**

Text Books

1	Charles A. Wentz; " Hazardous Waste Management ", McGraw-Hill Publication, 1995
2	W. C. Turner, Energy Management Handbook Wiley New york 1st edition.

Reference Books

1	The safe disposal of hazardous waste. Vol. I, II, & III Bat stone, Smith, Wilson, Joint study Sponsored by the world bank, the WHO, & UN Environmental Program UNEP,
2	The World Bank Freeman H.M. standard Handbook of Hazardous Waste Treatment and Disposal, 1989

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1	https://www.springer.com/series/15901
2	https://www.springer.com/series/15433
3	https://www.springer.com/series/8059

MOOCs Links and additional reading, learning, video material

1	https://archive.nptel.ac.in/content/storage2/courses/105106056/Introduction.pdf
2	https://onlinecourses.swayam2.ac.in/cec20_ge34/preview

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-26



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

II Semester

22ENV212– PE I : Water Resource Management

Course Outcomes :

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

1. Understand water resources planning
2. Understand water policies and the application of remote sensing.
3. Understand different methods of conservation and recharging of water resources
4. Understand inter-basin transfer and EIA of water Resource development projects

UNIT:1	Introduction	07 Hrs
Introduction: water resources planning, multi-objective planning role in national development (Contemporary issues related to topic)		
UNIT:2	Hydrology	06 Hrs
Basic concepts of hydrology and hydrogeology, River monitoring, gauging silting, silt load (Contemporary issues related to topic)		
UNIT:3	Water Resources Planning	07 Hrs
National water policy. Water resources planning and processes. Management of water bodies. Application of remote sensing Techniques. Integrated approach – carrying capacity based planning. (Contemporary issues related to topic)		
UNIT:4	Water resources conservation:	06 Hrs
Quantity aspects, surface and ground water development, Rain water harvesting, ground water recharge, conjunctive use of ground and surface water. (Contemporary issues related to topic)		
UNIT:5	Water resources development	07 Hrs
Coastal areas. Basic concepts of economics, welfare economics. Inter basin transfer of water. (Contemporary issues related to topic)		
UNIT:6	Case Studies on Water Conservation	06 Hrs
EIA of water Resource development projects. Case study related to water conservation and resources Development. (Contemporary issues related to topic)		
Total Lecture Hours		39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-27



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Text books

1	Linsey, R. K. & Franzini, J.B. water resources Engineering. New Delhi : McGraw Hill
2	Grigg N.S. Water Resources planning McGraw Hill Book company

Reference Books

1	Neil S. Grigg, Water resource management – principles, regulations, and cases New Delhi: McGraw Hill
---	--

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1	https://www.springer.com/series/15901
2	https://www.springer.com/series/15433
3	https://www.springer.com/series/8059

MOOCs Links and additional reading, learning, video material

1	https://nptel.ac.in/courses/105108081
2	https://nptel.ac.in/courses/105108130

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-28



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

II Semester

22ENV213– PE I : Environmental Biotechnology

Course Outcomes :

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

1. Understand the fundamental concept of microbial biochemistry and biotechnology
2. Understand the Relationship between cell signaling and gene transcription.

UNIT:1	Introduction	07 Hrs
Basic concept of microbial biochemistry-carbohydrates, proteins, fats, and nucleic acids. (Contemporary issues related to topic)		
UNIT:2	Biological Decomposition	06 Hrs
Basic concept of biodegradation, biotransformation, biobenefication, bio restoration / bioreclamation, microbial interaction, Environmental monitoring-signification of monitory bacterial viral and protozoan pathogens (Contemporary issues related to topic)		
UNIT:3	Monitoring Techniques	07 Hrs
Technique of monitoring-standard methods of monitoring viral bacterial and protozoan pathogens, Advance techniques-gene probes biosensor, immunoassay. (Contemporary issues related to topic)		
UNIT:4	Genetic	06 Hrs
Basic concept of genetic engineering-chromosomal DNA, plasmid DNA transformation, mutation recombinant DNA techniques (Contemporary issues related to topic)		
UNIT:5	Biotransformations	07 Hrs
Transudation conjugation, protoplast fusion, Biotransformation of biomass/organic waste into value added chemicals, energy, fertilizers, and single cell protein (Contemporary issues related to topic)		
UNIT:6	Application of Biotechnology	06 Hrs
Aerobic and anaerobic waste treatment processes-microorganisms involved, and biochemical changes of different pollutants present in liquid and solid waste, reactor technology. (Contemporary issues related to topic)		
Total Lecture Hours		39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-29



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Text books

1	C.S. Forster and D.A. John Wase, Environmental Biotechnology, Ellis Harwood, 1987
2	Trehan K. Biotechnology, New Delhi, Willey Eastern Ltd.1990

Reference Books

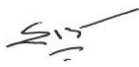
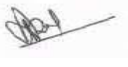
1	Forster C.F.N Biotechnology and Wastewater Treatment, Cambridge 1992
2	N.F. Grey, Biology of Wastewater Treatment Oxford University Press ,2009

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1	https://www.springer.com/series/15733
---	---

MOOCs Links and additional reading, learning, video material

1	https://nptel.ac.in/courses/102105088
2	https://archive.nptel.ac.in/content/syllabus_pdf/102105088.pdf

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-30



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

II Semester

22ENV214– PE I : Advanced Water Treatment

Course Outcomes :

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

1. Understand the fundamental, scientific basis governing the design and performance of the treatment technologies.
2. Understand the role of each unit operation.
3. Process within typical treatment process trains and their interaction.

UNIT:1	Introduction	07 Hrs
Significance of Advanced water treatment, water quality requirement and specific treatment for industries. (Contemporary issues related to topic)		
UNIT:2	Softening of water	06 Hrs
Softening of water, Boiler feed water, lime soda process, ion exchange process. (Contemporary issues related to topic)		
UNIT:3	Desalination	07 Hrs
Desalination: Theory of desalination, various methods of Desalination- Distillation, Electro dialysis, Freezing, Demineralization, Solar evaporation. Membrane filtration process. (Contemporary issues related to topic)		
UNIT:4	Adsorption	06 Hrs
Adsorption: Theory, Granular and powder activated carbon, Performance, and Reactivation. Materials and Reactions, Kinetics, Applications. (Contemporary issues related to topic)		
UNIT:5	Other Methods	07 Hrs
Fluoride Removal, Arsenic Removal, Fe and Mn removal, Taste, odor and colour removal. (Contemporary issues related to topic)		
UNIT:6	Miscellaneous methods	06 Hrs
Algae control, Corrosion control, Water treatment for Swimming Pool (Contemporary issues related to topic)		
Total Lecture		39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-31



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

**SoE No.
22ENV-101**

Text books

1	N.J. McGhee, Steel E.W., Water Supply and Sewerage, McGraw hill 1991
2	Fair Geyer & Okun, Water and Waste Water Engineering, Vol I and II, John Wiley & Sons 1st

Reference Books

1	Nordel, E, Water Treatment for Industrial and Other Uses, Reinhold Publishing Corporation, N.Y.
2	CPHEEO, Manual on Water supply and Treatment, Govt. of India Publication.

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1	https://www.springer.com/series/15733
---	---

MOOCs Links and additional reading, learning, video material

1	https://nptel.ac.in/courses/105105178
2	https://www.youtube.com/watch?v=hZIMFBuP8zc

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-32



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

II Semester

22ENV221– PE II : Environmental Legislations

Course Outcomes :

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

1. Explain legal aspects for environment protection.
2. Analyze legal provisions in various environmental acts.
3. Recommend environmental management plans, principles and standards
4. Differentiate powers of government, board & court judgment

UNIT:1	Introduction	07 Hrs
Indian Constitution and Environmental Protection– National Environmental policies– Environmental agreements and Protocols – Montreal Protocol, Kyoto agreement, Rio declaration (Contemporary issues related to topic)		
UNIT:2	Water Act 1974	06 Hrs
Power & functions of regulatory agencies - Provision relating to prevention and control, Legal sampling procedures, State Water Laboratory Penalties for violation of consent conditions. (Contemporary issues related to topic)		
UNIT:3	Air Act 1981	07 Hrs
Power & functions of regulatory agencies Provision relating to prevention and control, Legal sampling procedures, State Air Laboratory Authority – Penalties for violation of consent conditions. (Contemporary issues related to topic)		
UNIT:4	Environment (Protection) Act 1986	06 Hrs
Genesis of the Act – delegation of powers – Role of Central Government - Municipal Solid Waste Management – Responsibilities of Pollution Control Boards under Hazardous Waste rules, Biomedical waste rules – responsibilities of generators and role of Pollution Control Boards. (Contemporary issues related to topic)		
UNIT:5	Fundamentals of Environmental Management and ISO 14000 series	07 Hrs
Background and development of ISO 14000 series. Environmental management Plans, principles and elements. The ISO 14001- Environmental management systems standard. Environmental law in India: Environmental policies and laws. Contemporary Issues – ISO 9000 & its importance (Contemporary issues related to topic)		
UNIT:6	Other Topics	06 Hrs
Relevant Provisions of Indian Forest Act, Public Liability Insurance Act, The National Green Tribunal Act, 2010, The Wildlife (Protection) Act, 1972, The Forest (Conservation) Act, 1980 Contemporary Issues – Hazardous Waste management rules (Contemporary issues related to topic)		
Total Lecture		39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-33



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Text Books

1	Shyam Divan and Armin Roseneranz "Environmental law and policy in India "Oxford University Press, New Delhi, 2001.
2	Greger I. Megregor, "Environmental law and enforcement", Lewis Publishers, London 1994.
3	Constitution of India [Referred articles from part-III, part-IV and part-IV A]
4	Pares Distn. Environmental Laws in India (Deep, Lated edn.)
5	Handbook of environmental management and technology: Gwendolyn Holmes, Ben Ramnarine Singh, Louis Theodore.

Reference Books

1	CPCB, "Pollution Control acts, Rules and Notifications issued there under "Pollution Control Series – PCL/2/1992, Central Pollution Control Board, Delhi, 1997.
2	The ISO 14000 Handbook: Joseph Cascio.
3	ISO 14004: Environmental management systems: General guidelines on principles, systems and supporting techniques (ISO 14004:1996 (E)).
4	ISO 14001: Environmental management systems: Specification with guidance for use (ISO 14001:1996b(E) (International organization for standardization-Switzerland)

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1	https://www.springer.com/series/5921
2	https://www.springer.com/series/15053
3	https://www.springer.com/series/5921/books?page=5
4	https://link.springer.com/book/10.1007/978-981-10-6952-9
5	https://link.springer.com/book/10.1007/978-981-10-3761-0

MOOCs Links and additional reading, learning, video material

1	https://onlinecourses.nptel.ac.in/noc22_lw02/preview
2	https://onlinecourses.swayam2.ac.in/aic19_ge05/preview
3	https://onlinecourses.nptel.ac.in/noc22_hs126/preview
4	https://onlinecourses.nptel.ac.in/noc22_mm36/preview
5	https://onlinecourses.swayam2.ac.in/nou22_bt06/preview

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-34



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

II Semester

22ENV222– PE II : Applied Structure

Course Outcomes:

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

1. Design various pipes and associated structures.
2. Analyze different loads conditions applicable to different environmental structures
3. Design water tanks
4. Understand the importance of durability of water supply structures

UNIT:1	Introduction	07 Hrs
Basic Concept of Structural design of water supply and water collection system (Contemporary issues related to topic)		
UNIT:2	Design of pipes	06 Hrs
Design of pipes such as R.C.C. prestressed mild steel asbestos cement, cast iron etc. (Contemporary issues related to topic)		
UNIT:3	Estimation of loads	07 Hrs
Estimation of loads such as gravity earth forces, superimposed loads, moving loads, etc. On rigid and flexible conduits under various types of field conditions. (Contemporary issues related to topic)		
UNIT:4	Design of appurtenances	06 Hrs
Design of pipe supports, beddings, shallow and deep manholes, inverted siphons and other appurtenances etc. (Contemporary issues related to topic)		
UNIT:5	Design of tanks	07 Hrs
Design of tanks and prestressed structures for water such as circular and intake tank. (Contemporary issues related to topic)		
UNIT:6	Durability	06 Hrs
Study of Durability criteria for environmental structures (Contemporary issues related to topic)		
Total Lecture		39 Hours

Text Books

- | | |
|---|---|
| 1 | Jai Krishna & Jain O.P. plain & reinforced concrete, Vol. II, Roorkee: New Chand & Bros, 1980 |
|---|---|

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-35



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Reference Books

1 | N. Krishna Raju, advanced concrete structures, Tata McGraw Hill 1995

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

1 | <https://www.springer.com/series/5921>

2 | <https://www.springer.com/series/15053>

MOOCs Links and additional reading, learning, video material

1 | https://onlinecourses.nptel.ac.in/noc22_lw02/preview

2 | https://onlinecourses.swayam2.ac.in/aic19_ge05/preview

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-36



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

II Semester

22ENV223– PE II : Water Reuse and Recycling

Course Outcomes:

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

1. Understand the concept of sustainable water resources management as a foundation for water reclamation and reuse
2. Understand the various technologies and systems available for reclaimed water
3. Understand the Water reuse applications including agricultural uses, landscape irrigation, industrial uses, environmental and recreational uses, groundwater recharge.

UNIT:1	Introduction	07 Hrs
Hydrological cycle, Water Reuse Past and Current Practices, water Reuse Application. (Contemporary issues related to topic)		
UNIT:2	Environmental Issues	06 Hrs
Environmental Issues in water Reuse, Water Reclamation criteria in national and international scenario. (Contemporary issues related to topic)		
UNIT:3	Water reuses	07 Hrs
Water reuses treatment methods and technologies. (Contemporary issues related to topic)		
UNIT:4	Reclamation of water	06 Hrs
Storage of reclaimed water, water quality discharge requirements, Problems involved in storage system and its Management (Contemporary issues related to topic)		
UNIT:5	Water reuse regulation	07 Hrs
Water reuse regulation and guidelines, Health and risk management assessment in water reuse application. (Contemporary issues related to topic)		
UNIT:6	Water reuse application	06 Hrs
Water reuses application in agriculture, industrial, urban, groundwater recharge. (Contemporary issues related to topic)		
Total Lecture		39 Hours

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-37



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

Text Books

- | | |
|---|--|
| 1 | John, P. D., M. Cox, and P. S. Berger (1999) —Health and Aesthetic Aspects of Water Quality, in Water Quality & Treatment, A Handbook of Community Water Supplies, American Water Works Association, McGraw-Hill, Inc., New York |
|---|--|

Reference Books

- | | |
|---|---|
| 1 | T. Asano, Water Reclamation and Reuse, Water Quality Management Library 10, CRC Press, Boca Raton, FL |
|---|---|

YCCE e- library book links [ACCESSIBLE FROM COLLEGE CAMPUS]

- | | |
|---|---|
| 1 | https://www.springer.com/series/5921 |
| 2 | https://www.springer.com/series/15053 |

MOOCs Links and additional reading, learning, video material

- | | |
|---|---|
| 1 | https://www.digimat.in/nptel/courses/video/105105178/L01.html |
| 2 | https://onlinecourses.swayam2.ac.in/aic19_ge05/preview |

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-38



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

SoE No.
22ENV-101

III Semester

22ENV301– Project Phase-I

Course Outcomes :

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

1. Illustrate a sound technical knowledge of their selected project topic.
2. Write problem identification, formulation and solution.
3. Design engineering solutions to complex problems utilizing a systems approach including ability to work in a team.
4. Express effectively about the solution of the problem to enhance writing and communication skill.

The group of students will continue to work for the project allotted previously as per thrust area and will submit a project report (thesis) based on their studies. Evaluation will be done continuously, and viva voce conducted at the end of the semester.

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-39



Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M.Tech SoE and Syllabus 2022

(Scheme of Examination w.e.f. 2022-23 onward)

Department of Civil Engineering

M.Tech in Environmental Engineering

**SoE No.
22ENV-101**

IV Semester

22ENV401– Project Phase-II

Course Outcomes :

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

1. Illustrate a sound technical knowledge of their selected project topic.
2. Write problem identification, formulation and solution.
3. Design engineering solutions to complex problems utilizing a systems approach including ability to work in a team.
4. Express effectively about the solution of the problem to enhance writing and communication skill.

The group of students will continue to work for the project allotted previously as per thrust area and will submit a project report (thesis) based on their studies. Evaluation will be done continuously, and viva voce conducted at the end of the semester.

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairperson	Dean (Acad. Matters)	Date of Release	Version	

YCCE-CE-40