

B. Tech. III Semester V

Subject Name : Environmental Engineering **Subject Code:**BTCL13503
Type of course : PCC
Prerequisite : Environmental Science BTMD17102
Rationale : To develop clear understanding of sources of water, characteristics depending on the source and as a civil engineer in planning of a water supply scheme that can provide potable water to the community. It enables students to proper collection, handling of sewage and appropriate disposal. It develops a clear understanding of Solid waste management, the effect of air and noise pollution and its control, and Environmental Laws so as to help civil engineers for planning and management of environment pollution control and treatment units.

Teaching and Examination Scheme:

TEACHING SCHEME				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	25	15	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1.	Introduction: Water and wastewater sources, generation and characteristics, water crisis Indian and global scenario, importance of environmental awareness, environmental degradation, climate change	5	10%
2.	Water and Wastewater Management: Drinking water standard, Water borne diseases, Water, Components and layout of water supply scheme , Collection and conveyance of water, treatment of water –primary, secondary, tertiary, water conservation methods ,Wastewater disposal standards, treatment of sewage/ wastewaters, reuse of treated wastewater, Methods of sewage disposal, Indian standards for disposal of sewage, Self-purification capacity of river, Sewage farming, Components and layout of wastewater/sewage treatment plant and detailed functions of each unit, Principles of house drainage, System of plumbing, House drainage plan for building, Type of sewerage systems.	20	40%
3.	Solid Waste Management Quantity, composition and characteristics of solid wastes, Classification of solid wastes, Hazardous solid wastes, Biomedical solid wastes, E- wastes, Plastic wastes, typical generation rate for solid wastes, Indian and global scenario of waste generation and issues, factors affecting the generation rate, estimation of quantity of solid waste, onsite handling, storage and processing, collection services, processing techniques, waste disposal .	10	20%

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4.	Air and noise Management Classification and sources of air pollutants. Air quality standards, Effects of air pollution on human, plant and material, Basic Air pollution control methods Noise pollution: definition, measurement, standards, sources, effect and control measure.	8	20%
5.	Environment Acts Water Act, Air Act, Environment Protection Act, Motor vehicle Act, Waste management and handling rules	2	5%

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	25	25	20	5	5

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels (**Revised Bloom's Taxonomy**)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Water Supply and sanitary engineering	G. S. Birdie and J.S. Birdie	Dhanpat Rai Publishing company(P) Ltd. New Delhi (81-87433-31-0)	2011	Ninth
2.	Environmental Engineering	N N Basak	Tata McGraw-Hill Publishing company Limited (0-07-049463-0)	2007	fourth
3	Environmental Engineering	Gerard Kiely	Tata McGraw-Hill Publishing company Limited (0-07-063429)	2007	Special Indian edition
4	Wastewater Engineering: Treatment, disposal Reuse	Metcalf and Eddy	Tata-McGraw Hill education (India) (0-07-041878)	2003	Fourth
5	Environment Engineering Principles and practices	N S Varandani	Pearson (978-93-325-8195-1)	2017	first

6	Handbook of Environmental Engineering	Rao Y. Surampalli, P.E., BCEE, Dist.M.ASCE Tian C. Zhang, P.E., BCEE, F.ASCE Satinder Kaur Brar, Krishnamoorthy Hegde, Rama Pulicharla, Mausam Verma	McGraw-Hill Education (9781259860225)	2018	First
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Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Determine the quantity and quality of water required for public water supply and treatment to match drinking water standards and to identify methods for collection and conveyance of water(<i>R, U, A, N ---Cognitive level</i>)	25
CO-2	Interpret the effect of wastewater characteristics on human health as well as environment and to identify methods for collection and conveyance of sewage along with house drainage components and units(<i>U, A, N, E ---Cognitive level</i>)	20
CO-3	Classify solid waste and interpret the components of solid waste management system (<i>R, U, A, N, C---Cognitive level</i>)	25
CO-4	Analyse the effects of air and noise pollution on human and environment and develop its remedial measures(<i>A, N, E, C---Cognitive level</i>)	25
CO-5	Interpret environmental laws (<i>R, U, A---Cognitive level</i>)	5

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PS O2	PSO 3
CO-1	3	2	2	1	2	2	2	1	2	2	3	3	2	1	2
CO-2	2	2	2	3	3	2	1	2	2	2	2	1	1	3	3
CO-3	2	3	2	3	2	2	2	1	2	1	2	2	3	1	2
CO-4	1	2	2	3	2	2	1	2	1	3	2	2	2	2	2
CO-5	1	1	1	2	1	2	1	2	1	1	1	1	1	1	1
Rationale *	9	10	9	12	10	10	7	8	8	9	10	9	9	8	10

Rationale*: The study of environmental engineering will help to develop basic knowledge of water and wastewater, solid waste, air and noise pollution management and the associated environmental laws.



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Sarvajani College of Engineering and Technology
Bachelor of Technology
Civil Engineering



LIST OF PRACTICALS:

1. Physical Characterization of water: Turbidity, Conductivity, pH
2. Analysis of solids content of water: Dissolved, Settleable, suspended, total, volatile, inorganic etc.
3. Determination of Alkalinity and acidity
4. Determination of Hardness: total hardness, calcium and magnesium hardness
5. Determination of Chlorides
6. Determination of Optimum coagulant dose: Jar Test
7. Chemical Oxygen Demand (COD)
8. Dissolved Oxygen (D.O) and Biochemical Oxygen Demand (BOD)
9. Determination of residual chlorine in water
10. Bacteriological quality measurement: MPN,
11. Ambient Air quality monitoring (SPM, SO_x, NO_x)
12. Ambient noise measurement

Major Equipment:

1. BOD incubator
2. COD digester
3. Hot air oven
4. Muffle furnace
5. Electronic Balance (Accuracy: 1mg)
6. Jar Test Apparatus
7. pH, Turbidity, TDS and Conductivity meter
8. Sound level meter
9. High volume sampler
10. Microbial Incubator

List of Open Source/learning website:

1. LABORATORY TRAINING MANUAL FOR WASTEWATER TREATMENT (Practicals)
https://www.michigan.gov/documents/deq/wrd-ot-ww-lab-manual_558729_7.pdf
2. Module 2: Wastewater collection and conveyance
<https://nptel.ac.in/courses/105/105/105105048/>
3. Module 1, 2: Water quality, intake, characteristics, treatment
<https://nptel.ac.in/courses/105/104/105104102/#>
4. Module 3: Solid waste management
<https://nptel.ac.in/courses/105/103/105103205/>
5. Module 4: Air pollution and control
<https://nptel.ac.in/courses/105/104/105104099/>

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