



**Kadi Sarva Vishwavidyalaya's
LDRP Institute of Technology & Research
Gandhinagar-382 015**



**M.E.(Civil) Infrastructure Engineering Semester: III
Subject Name: Design of Water and Waste Water System (MECV302-A)**

A. Course Objective:

- To give an experience in the implementation of engineering concepts which are applied in field of environmental engineering.
- To provide a coherent development to the students for the courses in sector of engineering like Water and waste water system.
- To provide a coherent development in design sector.
- To analyze the water sources and water & waste water characteristics.
- To develop various water & waste water system.
- To present the foundations of many basic Engineering tools and concepts related Environmental Engineering.

B. Teaching /Examination Scheme :

Teaching scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract/ Tut.	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
04	00	02	06	05	03	70	30	20	30	150



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C. Detailed Syllabus:

UNIT

DETAILED SYLLABUS

- 1. Wastewater Characteristics :** Sampling, composition and variations and preservation of samples, Physical, Chemical and biological characteristics, and analysis of wastewater.
- 2. Pollution of Natural Waters:** Emission and receiving body standards. Stream pollution. Ocean disposal.
- 3. Reactor Design :** Types, Kinetics, Selection of different reactors used for waste water treatment.
- 4. Wastewater Treatment Fundamentals :** Flow sheets, Physico-chemical and biological processes, Screens, Grit chambers, Sedimentation, Equalization, Neutralization, Floatation and chemical treatment of waste waters.
- 5. Biological Treatment Processes :** Fundamentals of Monod's Kinetics and application in bioreactor Design Aerobic and anaerobic, Suspended – growth and attached – growth treatments, Types, Modifications, Activated – sludge unit, Trickling filters, Aerated lagoons, Stabilization ponds, Oxidation ditches, Aerators. Theory of sludge handling treatment and disposal.
- 6. Sludge Treatment :** Treatment system Chemical ,Biological, Incineration and disposal of sludge solids
- 7. Advances in Wastewater Treatment :** Nitrification, Denitrification, Phosphorous and other nutrient removal treatment processes , Total dissolved solid removal methods Introduction Use members and nano-technological -processes for waste water treatment.
- 8. Reuses of waste water :** Industrial , Agricultural and domestic

D. Lesson Planning :

Sr. No.	Title of the Unit	Minimum Hours	Weightage (%)
1.	Wastewater Characteristics	04	5
2.	Pollution of Natural Waters	06	10
3.	Wastewater Treatment Fundamentals	18	10
4.	Biological Treatment Processes	18	45
5.	Sludge Treatment	04	10
6.	Advances in Wastewater Treatment	07	15
7.	Reuses of waste water	03	5
	Total	60	100



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E. Instructional method and pedagogy (Continuous Internal Assessment Scheme) (CIA) :

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and practical which carries marks.
- At regular intervals assignments will be given. Students should submit all assignments during given period.
- Classroom participation and involvement in solving the problems in Tutorial rooms Carries Marks
- Internal exam of 30 marks will be conducted as a part of Mid semester evaluation.
- Experiments shall be performed in the field related to course contents.
- The course includes a practical, where students have an opportunity to build an appreciation for the concept being taught in lectures.

F. Students Learning Outcomes:

- The students will gain an experience in the implementation of Transportation Engineering on engineering concepts which are applied in field Highway Engineering.
- The students will get a diverse knowledge of highway engineering practices applied to real life problems.
- The students will learn to understand the theoretical and practical aspects of highway engineering along with the design and management applications.

G. List of Experiments:

- Waste Water Sampling, Preservation and storage . Exposure Integrated , Composite and grab sampling techniques and instrumentation
- Major Physical Parameter Testing of Sewage and Industrial waste waters
- DO and BOD testing using conventional laboratory methods.
- Determination rate constant of BOD utilization and oxygenation
- Determination of COD with modification for different special waste water
- Determination of parameters of major chemical parameters like Nitrogen compounds , Phosphorous compounds
- Model of aeration waste treatment and its performance.
- Report of Performance evolution of a waste water treatment plant
- Demonstration of Viruses and microorganisms using Electron microscope



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- Exercise on Monod's kinetics
- Exercise on Microbial metabolisms

H. Recommended Study Materials

➤ **Reference Books:**

- Wastewater Engineering Disposal & Reuse by George Tchobanoglous by Tata
- Metcalf & Eddy - McGraw Hill 2003 edition or later
- Water and Wastewater Treatment by Schroeder - McGraw Hill
- Water & Wastewater Engineering – II by Fiar, Geyer & Okun - John Wiley
- Standard Methods of Testing Water and Waste water Latest Edition Published jointly APHA, AWWWA, WPCF

➤ **Web Materials:**

- <http://www.epa.gov>
- <http://www.indiaenvironmentportal.org.in>
- <http://nptel.iitm.ac.in>
- <http://www.filtersource.com>
- <https://dgserver.dgsnd.gov.in>
- www.nesc.wvu.edu