

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Skills Enhancement Program (SEP) - 2022

Name of Department	Civil Engineering Department
Module Name	Design of Waste-Water treatment systems as per CPHEED & B/S Norms.
Module Coordinator	(i) Prof. A.K. Saxena(AKS) (ii) Prof. Aditya Agrawal (AA) (iii) Prof. (Dr.) Prachi Singh (PS)
Module Objectives	<ul style="list-style-type: none">• Main objective of the module is to introduce crikarea of various waste water treatment units• To provide clear concept of how to design various modern waste water treatment plants.• Provide detail concept of how to choose suitable treatment units under given set of waste water characteristics.• Students will develop skill & knowledge to propose suitable ETP/STP strategy.• Students will be able to understand merits, demerits and applications of various types of treatment units & processes prevailing in modern day.• Students will be ready to work in consultancy & construction agencies related to environmental field.• To bridge over the gap between theory & real life practices in the domain.• To enhance adoptability & employability of the students in changed scenario.• To appraise about CPCB SPCB, CPHEEO, MEOF norms to the students.• Valued addition & skill development in related field.
Module Contents	<ul style="list-style-type: none">• Characterization of Waste Water Sewage. Methods of analysis for characterization & significance of each characters.• Effects of Waste Water on various elements of Environment.• Concept of treatment, unit operations, unit processes.• Treatment System, Selection of Treatment system. Basic design considerations, population projection, design periods, fore-casting methods.• Flow rates & their variation.• Concept of mass loading. Concepts of design criteria (Detention time, flow through velocity, settling velocity, SLR, OFR WLR organic loading, volumetric loading, F/M ratio, Mean cell residence time SRT. Hydraulic flow diagram (HFD).• General procedure for design calculations. Reactions reactor : Types of reactors, reaction rates, types of reactors.

	<ul style="list-style-type: none"> • Design of preliminary & primary treatment, design of approach channel, • Equalization Basin, Screen Chamber, Grit chamber (Aerated grit chamber), Oil & grease trap, Primary settling tank
Secondary treatment	Aerobic & anaerobic treatment. Design of Activated sludge process, Stabilization/oxidation pond. Septic Tank Oxidation ditch Sequential Batch reactor Rotating Biological Contactor Bio-Tower USAB
Anaerobic treatment	Sludge digestion Sludge treatment Biogas reactors Sludge drying Beds.
Tertiary treatment	<ul style="list-style-type: none"> • Disinfection • Nitrogen & Phosphores removal • Colour/odour removal. • Various Treatments MBR, MBBR, etc.
Module Methodology	Module will be covered by imparting theoretical knowledge, practicing numerical design examples. Visiting existing STP, preparing a mini group projects.
Module outcome	<ul style="list-style-type: none"> • The knowledge & understanding of design procedure of various treatments units will enhance job potential of students. • Students will be able to meet job expatiations of employer after getting skill of designing various STP components. • Student can start a start up provide ready methods for packaged treatments. • Students can actively participate in government schemes & projects like Swachh Bharat Abhiyan, Amrut Yojana, NGT, National coastal management programme, National river conservation programme, Clean India programme, Green Skill development plan, etc.
Duration	5 week (25 working days) 75 Hours
Module Coordinator Email ID :	(1) Prof. A.K. Saxena (2) Prof. Aditya Agrawal (3) Dr. Prachi Singh akSaxena@mitsgwalior.in (2) (3) Mobile No. (1) 9425341422 (2) (3)

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DAY WISE SHEDULE				
Week	Date	Day	Module contents (Theory/interactive session/ quizzes/territorial/problem solving/Assignments/fields visit/seminar by students/Group discussion	Faculty
1 st		Mon	Effects of waste water on various elements of environment, river Sea, ground water.	AKS
		Tues	Physical & chemical characteristics of Sewage	AKS
		Wed	Physical & chemical characteristics of Sewage	AKS
		Thus	Self purification of Water bodies	AKS
		Fri	Flow variation, Design period, population fore casting	AKS
2 nd		Mon	Pumping & pumping Stations	AKS
		Tues	Disposal of Waste Water, Sewage sickness, land disposal eutrophication, CPC3 norms of disposal	AKS
		Wed	Concepts of treatment, unit operations, unit process Treatments systems, selection of Treatment system.	AKS
		Thus	Basic design considerations flow rates, mass loading concepts, detention time velocity of flow settling velocities, SLR, OFR, WLR organic or volumetric loading F/M ratio MCRT, HFC	AKS
		Fri	General design principles Sizing of unit Reactions & reactors, CFSTR, PFR, BR, FBR PBOR	AKS
3 rd		Mon	Design of approach channel, design of equalization Basins, Design of Screens.	AKS
		Tue	Design of Grif chamber, Aerated grit chamber flow control devices, Par shall flume.	AKS
		Wed	Theory of setting settling.	AKS
		Thus	Biological treatment, concept of biological treatment, classification, Bio kinetic Coefficients, Basic kinetic constant equation basic design equations.	AA
		Fri	Types of reactors selected, HRT, SRT, F/M ratio, Microbial growth pattern, organic loading oxygen required, air required power requirement, sludge production sludge quality SVI SDI	AA
4 th		Mon	Activated sludge process, removal mechanism conventional ASP, Design Consideration, modification SST.	AA
		Tues	Design of oxidation diches, Design critereaa Design examples.	AA
		Wed	Design of Septic Tank, Cess Pool/Soak pit design criteria, Problem solving	AA
		Thus	Stabilization Pond, removal mechanism site selection, constructional features, design critereaa	AA
		Fri	Aerated lagoons SBR process design, MBBR	AA

5 th	Mon	Biotowers, Rotating Biological contactor, Design criterearea	PS
	Tues	Anaerobic treatment, removal mechanism products of digestion, factor affecting anaerobic diagection, USAB.	PS
	Wed	Sludge treatment elutriation, washing, thickening concentration, volume weight relationship.	PS
	Thus	Tertiary treatment : disinfection, N & P remover, ultra filtration etc.	PS
	Fri	Miscellaneous Treatments : MBR, MBBR, read bed technology, etc.	PS

Eligibility & Important Instructions :

- This Programmes is designed for pre final year students of Civil Engineering.
- Student must have studied course of Waste Water Engineering.
- Course is free from fee
- Participants outside the institute may also join on payment basis Rs 3000/-
(certificate will be issue.
- Students have to submit home assignments regularly.
- Certificate will be issued to those students who have more than 75% attendance &
scored more than 60% marks in final valuation.
- Course will be conducted online.