



SCHEME AND SYLLABI FOR M. Tech. DEGREE PROGRAMME IN
ENVIRONMENTAL ENGINEERING

SEMESTER - I

CourseNo.	Subject	Hrs / Week			Internal Marks	End Semester Exam.valuation Scheme (Marks)		Credits
		L	T	P		Marks	Duration (Hrs)	
1MEVE01	Environmental Chemistry and Microbiology	3	1	0	40	60	3	4
1MEVE02	Air Pollution and Control	3	1	0	40	60	3	4
1MEVE03	Rural Water Supply and Sanitation	3	1	0	40	60	3	4
1MEVE04	Water and Wastewater Treatment	2	1	0	40	60	3	3
1MEVE05	Water Quality Lab	1	1	0	60	40	0	2
	Total (500)				220	280		20

SEMESTER -II

Course No.	Subject	Hrs / Week			Internal Marks	End Semester Exam.valuation Scheme (Marks)		Credits
		L	T	P		Marks	Duration (Hrs)	
2MEVE01	Advanced Water Treatment Technology	3	1	0	40	60	3	4
2MEVE02	Groundwater Pollution	2	1	0	40	60	3	3
2MEVE03	Environmental Hydraulics	2	1	0	40	60	3	3
2MEVE04	Environmental Risk Assessment	2	1	0	40	60	3	3
2MEVE05	Wastewater Analysis Lab	0	0	2	60	40	0	2
	Total (500)				220	280		18



SEMESTER – III

Course No.	Subject	Hrs / Week			Internal Marks	End Semester Exam. valuation Scheme (Marks)		Credits
		L	T	P		Marks	Duration (Hrs)	
3MEVE01	Industrial Wastewater Treatment Technology	2	1	0	40	60	3	3
3MEVE02	Water Quality Modelling	2	1	0	40	60	3	3
3MEVE03	Seminar	0	0	2	--	100	0	2
3MEVE04	Dissertation-I	0	0	2	--	200	0	2
	Total=500				80	420		

SEMESTER – IV

Course No.	Subject	Hrs / Week			Internal Marks	End Semester Exam. valuation Scheme (Marks)		Credits
		L	T	P		Marks	Duration (Hrs)	
4MEVE01	Dissertation Part-II	0	0	21	--	400	0	12
	Total (400)					400		12



Course Syllabus

M. Tech – I Year – I Sem. (Env. Engg.)

1MEN1-01: ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY

S. N.	Course Content	Contact Hours
1	INTRODUCTION :Objective, scope and outcome of the course	1
2	Physical Chemistry : Thermodynamics, Free Energy, osmosis, dialysis, law of mass action, chemical equilibrium and basic concepts of chemical kinetics.	7
3	Biochemistry : Biochemistry of carbohydrates, proteins, fats and oils, Enzymes, buffers, EMP and TCA pathways, electron transport mechanism and oxidation phosphorylation, photosynthesis.	8
4	General Chemistry : Henry's law, activity coefficients, ionization of weak bases, and acids, solubility product, common ion effect, ways of shifting chemical equilibria, Adsorption isotherms.	8
5	Microbiology : Morphology and classification of bacteria, algae, fungi and viruses, elements of microscopy, Microorganisms of various aerobic and anaerobic biological waste treatment units, culture media for microorganisms, sterilization.	8
6	Culture of microorganisms in batch and continuous reactors, energy and kinetics of microbial growth and metabolism and biological fate of pollutants. Microbiology of water, soil and air. Water and air borne diseases and their causative organisms, concept of indicator organisms. Tests for coliforms and streptococci and their significance, MPN and MF techniques, bacteriological standards.	8
	Total	40

Recommended Text Books:

1. C.N Sawyer, P.L McCarty and G.F Parkin, Chemistry for Environmental Engineering and Science, 5th ed. Tata McGraw-Hill, 2003
2. Pelczar, Jr, M.J., Chan E.C.S., Krieg, R.Noel., and Pelczar Merna Foss, Microbiology, 5th Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 1996.

Recommended Reference Books:

1. B.S Bhal, GD Tuli and Arun Bhal, Essentials of Physical Chemistry, S. Chand & Co Ltd. New Delhi, 2003
2. Arun Kumar De, Environmental Chemistry, 5th ed, New Age International (P) Ltd, New Delhi
3. Stainer, R.Y., Ingraham, J.L., Wheelis, M.C. and Painter, P.R. General Microbiology, MacMillan Edition Limited, London, 1989.
4. Pichai R. and Govindan, V.S., Edition, Biological processes in pollution control Anna University, Madras, 1988.



M. Tech – I Year – I Sem. (Env. Engg.)

1MEN1-02: AIR POLLUTION AND CONTROL

S. N.	Course Content	Contact Hours
1	INTRODUCTION :Objective, scope and outcome of the course	1
2	Sources and classification: Classification of aerosols, gases vapours, natural air pollutants, properties of air pollutants. Meteorology: Factors influencing air pollution, wind roses, plume behaviour, estimation of plume rise. Air pollution standards and indices.	7
3	Air Quality Monitoring: Objectives, time and space variability in air quality, air sampling design, analysis and interpretation of air pollution data. Air Pollution Modelling: Dispersion models – Basquill model, ASME model, Gaussian plume model assumptions, limitations.	8
4	Effects of Air Pollutants: Effect on man, material, vegetation, art treasures. Air pollution disasters, Economic effects. Global effects of Air Pollutants: Green house effect, acid rains, ozone hole, heat islands.	8
5	Air pollution due to automobiles: Vehicular emissions, motor fuel combustion, automobile emission control, general concepts of transport planning for prevention of air pollution.	8
6	Particulate control Technology: Dilution, control at source by equipments, setting chambers, cyclones, fabric filters, electrostatic precipitators, scrubbers. Control of Gaseous Pollutants: Adsorption, absorption, combustion, condensation. Indoor air pollution control.	8
	Total	40

Recommended Text Books:

1. Richard W. Boubel et al “Fundamentals of Air pollution”, Academic Press, NewYork, 1994.
2. Noel de Nevers, Air Pollution Control Engineering, McGraw Hill, New York, 1995.
3. M.N. Rao et al, “Air Pollution” Tata McGraw Hill, 1989.

Recommended Reference Books:

1. Wark K. & Warner C.F., Air Pollution its origin and Control.
2. Martin Craford (1980), Air Pollution Theory, Tata McGraw Hill Publishers
3. Stern A.C. (1968) Air Pollution, Vol. 1 - 5, Academic Press, New York.
4. Perkins H.C. (1974) Air Pollution, Mc Graw Hill Kogakusha Ltd., Tokyo



1MEN2-12: RURAL WATER SUPPLY AND SANITATION

S. N.	Course Content	Contact Hours
1	INTRODUCTION :Objective, scope and outcome of the course	1
2	General: Importance of village community in India, Condition of Indian villages with special regard to economics, social and health aspects. Sources of water: Traditional sources of water in rural areas. Different types of wells, sanitary aspects in well construction, pumps used for village wells, Hand pump Technology, its operation and maintenance. Water harvesting techniques.	7
3	Quality of water: Estimation of total water requirement including cattle water demand, quality of water needed for village community, water quality surveillance, standards of water quality. Communicable Diseases: Diseases and immunity, Source of communicable diseases, Mode of transfer, Control of communicable diseases, Guinea worm Eradication.	8
4	Water Treatment: Slow sand filter, horizontal roughing filter and their combination. Disinfection of rural water sources, Fluoride and its removal. Schemes of Rural water supply: Different Schemes of Rural water supply in Rajasthan, Their Design and project formulation including the programmes and standards laid by Govt. of India and Govt. of Rajasthan.	8
5	Milk and Food sanitation: Essentials of dairy farm and cattle shed sanitation, Tests for milk and dairy products, food epidemics, food poisoning, Botulism. Fly and Mosquito control: Life cycle of flies and mosquitoes, various methods of flies and mosquito control.	8
6	Rural Sanitation: Village latrines, VIP latrines, pour flush latrines, materials, construction and cost of the latrines, Pollution aspects and pollution travel from latrines. Storm water and sludge problems. Septic tank, soak pit, small bore sewer system; its design and construction. Animal waste, method of composting, Biogas, collection and disposal of wastes. Community Awareness and user participation: Planning of communication support in rural supply and sanitation projects.	8
	Total	40

Recommended Text Books:

1. Municipal and Rural Sanitation E.W. Steel, McGraw Hill Book Co.
2. Wastewater Engineering, Treatment and Reuse: Metcalf and Eddy, Tata McGraw Hill Publication, New Delhi

Recommended Reference Books:

1. Rural Water Supply & Sanitation Manual by Govt. of India
2. Reports of Rajeev Gandhi National Drinking Water Mission, GOI.
3. Environmental Sanitation: J.A. Salvato



1MEN2-15: WATER AND WASTEWATER TREATMENT

S. No.	Contents	Contact Hours
1	Introduction: Objective, scope and outcome of the course	1
2	Water Quality: Physical, chemical and biological parameters of water- Water Quality requirement - Potable water standards - Wastewater Effluent standards -Water quality indices.	5
3	Water purification systems in natural systems: Physical processes-chemical processes and biological processes-Primary, Secondary and Tertiary treatment-Unit operations-unit processes.	6
4	Sedimentation: Types, Aeration and gas transfer, Coagulation and flocculation, coagulation processes - stability of colloids - destabilization of colloids transport of colloidal particles, Clari-flocculation.	8
5	Filtration : theory of granular media filtration; Classification of filters; slow sand filter and rapid sand filter; mechanism of filtration; modes of operation and operational problems; Disinfection: Factors affecting disinfection, Disinfection - chlorine dioxide; chloramines; ozonation; UV radiation.	12
6	Miscellaneous Methods: Ion Exchange-processes, Application of Membrane Processes, Reverse Osmosis, Micro-filtration, Nano-filtration, Ultra-filtration and Electro-dialysis. Wastewater Treatment Technologies: Introduction, Detailed Design Criteria, Advantages and disadvantages.	8
	Total	40

Recommended Text Books:

1. Metcalf and Eddy, Wastewater Engineering, Treatment and Reuse, Tata McGraw Hill Publication, New Delhi, 2003
2. Water & Waste Water Engineering by Fair and Gayer.

Recommended Reference Books:

1. Weber, W.J., Physicochemical processes for water quality control, John Wiley and sons, Newyork, 1983.
2. Peavy, H.S., Rowe, D.R. and Tchobanoglous, G. Environmental Engineering, McGraw Hills, New York 1985.
3. C.A.Sastry, Water Treatment Plants, Narosa Publishing House, Bombay, 1996.



1MEN1-06: WATER QUALITY LAB Measurement of Water Quality Parameters

S. N	Experiment
1	Introduction to Standards, Sampling, Collection & Preservation of Samples
2	Determination of pH, Colour and Odour for a water sample
3	Determination of Acidity and Alkalinity for a water sample
4	Determination of Conductivity for a water sample
5	Determination of Calcium, Magnesium and Total Hardness for a water sample
6	Determination of Turbidity for a water sample
7	Determination of Chlorides for a water sample
8	Determination of Nitrates for a water sample
9	Determination of Optimum Dosage of Alum using Jar test apparatus.
10	Determination of available chlorine in bleaching powder and Residual Chlorine for a water sample

Recommended Text / Reference Books / Manuals:

1. Lab Manual, ISO 14001 Environmental Management, Regulatory Standards for Drinking Water and Sewage disposal.
2. Clair Sawyer and Perry McCarty and Gene Parkin, "Chemistry for Environmental Engineering and Science", McGraw-Hill Series in Civil and Environmental Engineering.
3. Guide manual: Water & wastewater analysis, Central Pollution Control Board, Govt. of India.
4. APHA standard methods for the examination of water and wastewater – 20th edition.
5. Water supply engineering by S.K. Garg- 30th Edition, Khanna Publications, New Delhi
6. Environmental Engg. Laboratory Manual by R.P. Mathur



M. Tech – I Year – II Sem. (Env. Engg.)

2MEN1-01: ADVANCED WATER TREATMENT TECHNOLOGY

S. No.	Contents	Contact Hours
1	INTRODUCTION :Objective, scope and outcome of the course	1
2	Water Quality Parameters: Significant water quality parameters for Municipal Water Supplies. Standards and Guidelines of Water for drinking purposes.	7
3	Water Treatment: Settling types, Discrete particle settling, Flocculent Settling, Theory of Tube Settlers, Plate Settlers, Choice of Clarifiers, Ideal sedimentation Tank Concept.	8
4	Coagulation: Theory, Chemistry and Mechanism of Coagulants, Coagulant Aids, Flocculation, Orthokinetic, Perikinetic, Mean Velocity Gradient, Long Rectangular Basin, Circular Basin Design of Clariflocculators.	8
5	Filtration: Theory, Carman Kozeny equation, Filter Arrangement, Filter operation. Disinfection: Types, Mechanisms of, Factors Influencing Efficiency of Disinfectants, Chlorine Chemistry, Chlorinator.	8
6	Miscellaneous Methods: Process and Application of Ion Exchange, Adsorption, Reverse Osmosis, Electro-dialysis.	8
	Total	40

Recommended Text Books:

1. Water Supply and Sanitary Engineering G.S. Bridie & J.S. Brides, Dhanpat Rai & Sons.
2. A Treatise on Rural, Municipal, and industrial water management, KVSG Murali Krishna.
3. Weber W.J., (1975) "Physico - Chemical Processes for Water Quality Control".

Recommended Reference Books:

1. AWWA, (1971), "Water Quality and Treatment" McGraw Hill.
2. CPHEEO Manual, (1991), "Water Supply and Treatment", GO Publications.
3. Peavy, H.S., Rowe and Tchobonoglous, G., (1985), "Environmental Engineering", McGraw Hill



2MEN2-11: GROUNDWATER POLLUTION

S. No.	Contents	Contact Hours
1	INTRODUCTION :Objective, scope and outcome of the course	1
2	WATER QUALITY : Natural occurrence of common solutes in water, Suspended & dissolved constituents, Principle chemical constituents in ground water, water quality criteria for drinking, Agricultural and Industrial uses, Quality of ground water resources.	7
3	SOURCES OF POLLUTION : Various sources & causes of ground water pollution. Activities generating contaminants, Types of contaminants & Mechanism of ground water pollution	8
4	MOVEMENT OF POLLUTANTS : Principles of Pollutant movement (Darcy's law, Hydraulic Conductivity, Anisotropic Aquifer), Attenuation of pollution in the ground, Pollution dispersion in the ground. Ground water movement in saturated zone. Factors affecting Pathogen movement & Survival, Transportation equation, ground water remediation.	8
5	PROBLEMS OF TOTAL DISSOLVED SOLIDS : Fluoride & Nitrate Pollution of ground water, Natural occurrence of Nitrates & sources related to man's activities. Groundwater Legislation in India and Case histories, Salt water intrusion and related artificial recharge studies.	8
6	MONITORING GROUNDWATER QUALITY : General principles, Monitoring Management of Ground Water Quality, Section of Parameters for Monitoring. Economic considerations in ground water quality management.	8
	Total	40

Recommended Text Books:

1. Todd D. K. Groundwater Hydrology , John Wiley publishers , 2004
2. Jacob and Bear, Hydraulics of Groundwater, McGraw Hill, 1997

Recommended Reference Books:

1. Raghunath, Groundwater & Well Hydraulics, Wiley Eastern Ltd, New Delhi, 1992
2. Groundwater Pollution, Volume 41st Edition by J.J. Fried.



M. Tech – I Year – II Sem. (Env. Engg.)

2MEN2-14: ENVIRONMENTAL HYDRAULICS

S. No.	Contents	Contact Hours
1	INTRODUCTION :Objective, scope and outcome of the course	1
2	Evaporation and infiltration : measurement and estimation of evaporation from land and water surfaces. Infiltration, factors affecting infiltration. Hydrograph analyses : Surface runoff, overland flow, factors affecting runoff. Rational formula. Hydrograph analyses, Unit hydrograph, channel and storage routing.	7
3	Groundwater Development : Well development, Artificial recharge, Salinity of Ground water, Ground water pollution, Infiltration Galleries.	8
4	Water Distribution System : General design requirements, Methods of analyses, control of water hammer in long distance transmission. Introduction to optimization of water distribution system.	8
5	Sewerage system design : General design principles of sewers, Recent development in sewerage system design. Urban Storm Drainage : Introduction to drainage problems in difficult climates. Planning concepts, Rainfall intensity-duration-frequency curves. Design of drainage system elements, control of storm water pollution.	8
6	Water and wastewater pumping : Classification, selection, installation, operation and maintenance of pumps for water and wastewater pumping, electrical motors, choice and installation, starters and other accessories.	8
	Total	40

Recommended Text Books:

1. Chow VT, Maidment DR and Mays LW, Applied hydrology, Tata McGraw Hill, New Delhi (2010).
2. "Ground Water", H.M. Raghunath, Wiley Eastern Limited, New Delhi, 2007.
3. "Ground Water Hydrology", David Keith Todd, Wiley India Pvt. Ltd., 2005.

Recommended Reference Books:

1. McGhee, Water supply and sewerage, McGraw Hill, New Delhi (1991).
2. Wurbs RA and James WP, Water resources engineering, PHI New Delhi (2002).
3. Nathanson, JA, Basic environmental technology, PHE, New Delhi (2003).
4. A. Vermjit, "Theory of Groundwater Flow" - MacMillan, 1970
5. H. Boluwer, "Groundwater Hydrology" - McGraw Hill, Kogakusha, 1979



M. Tech – I Year – II Sem. (Env. Engg.)

2MEN2-15: ENVIRONMENTAL RISK ASSESSMENT

S. No.	Contents	Contact Hours
1	INTRODUCTION :Objective, scope and outcome of the course	1
2	Sources of Environmental hazards: Environmental and ecological risks, Environmental risk assessment framework, Regulatory perspectives and requirements, Risk Analysis and Management and historical perspective; Social benefit v/s technological risks; Path to risk analysis; Perception of risk, risk assessment in different disciplines	7
3	Elements of Environmental Risk Assessment: Hazard identification and accounting, Fate and behaviour of toxics and persistent substances in the environment, Properties, processes and parameters that control fate and transport of contaminants, Receptor exposure to Environmental Contaminants, Dose Response Evaluation, Risk Characterization and consequence determination, Vulnerability assessment, Uncertainty analysis.	8
4	Tools and Methods for Risk Assessment: HAZOP and FEMA methods, Cause failure analysis, Event tree and fault tree modelling and Analysis, Multimedia and multipath way exposure modelling of contaminant migration for estimation of contaminant concentrations in air, water, soils, vegetation and animal products, Estimation of carcinogenic and non carcinogenic risks to human health, Methods in Ecological risk assessment, Probabilistic risk assessments, radiation risk assessment, Data sources and evaluation.	8
5	Risk Management: Risk communication and Risk Perception, comparative risks, Risk based decision making, Risk based environmental standard setting, Risk Cost Benefit optimization and tradeoffs, Emergency Preparedness Plans, Emergency planning for chemical agent release, Design of risk management programs, risk based remediation; Risk communication, adaptive management, precaution and stake holder involvement	8
6	Applications: Case studies on risk assessment and management for hazardous chemical storage, Chemical industries, Tanneries, Textile industries, Mineral processing and Petrochemical plants, Hazardous waste disposal facilities, nuclear power plants, contaminated site remediation, Case histories on Bhopal, Chernobyl, Seveso, Three Mile Island.	8
	Total	40

Recommended Text Books:

1. Cutter, S.L., Environmental Risk and Hazards, Prentice-Hall of India Pvt. Ltd., New Delhi, 1999.
2. Kolluru Rao, Bartell Steven, Pitblado R and Stricoff, "Risk Assessment and Management Handbook", McGraw Hill Inc., New York, 1996.
3. Kofi Asante Duah, "Risk Assessment in Environmental management", John Wiley



and sons, Singapore, 1998.

Recommended Reference Books:

1. Kasperson, J.X. and Kasperson, R.E. and Kasperson, R.E., Global Environmental Risks, V.N. University Press, New York, 2003.
2. Risks and Decisions for Conservation and environmental management, Mark Burman, Cambridge University Press.
3. Susan L Cutter, "Environmental Risks and Hazards" Prentice Hall of India, New Delhi, 1999.

M. Tech – I Year – II Sem. (Env. Engg.)

2MEN1-06: WASTEWATER ANALYSIS LAB (Measurement of Wastewater / Sewage Parameters)

S.N.	Experiment
1	Determination of Total Solids in sewage sample
2	Determination of Dissolved and Suspended Solids in sewage sample
3	Determination of Volatile and Fixed Solids in sewage sample
4	Determination of Settle able Solids in sewage sample
5	Determination of Dissolved Oxygen in wastewater sample
6	Determination of BOD in wastewater sample
7	Determination of COD in wastewater sample
8	Determination of Heavy Metals in wastewater sample
9	Introduction to Microscope, its types & applications
10	Introduction to MPN and MF techniques

Recommended Text / Reference Books / Manuals:

1. Lab Manual, ISO 14001 Environmental Management, Regulatory Standards for Drinking Water and Sewage disposal.
2. Clair Sawyer and Perry McCarty and Gene Parkin, "Chemistry for Environmental Engineering and Science", McGraw-Hill Series in Civil and Environmental Engineering.
3. Guide manual: Water & wastewater analysis, Central Pollution Control Board, Govt. of India.



4. APHA standard methods for the examination of water and wastewater – 20th edition.
5. Environmental Engg. Laboratory Manual by R.P. Mathur

M. Tech – II Year – IV Sem. (Env. Engg.)

3MEN2-11: INDUSTRIAL WASTEWATER TREATMENT TECHNOLOGY

S. No.	Contents	Contact Hours
1	Introduction :Objective, scope and outcome of the course	1
2	General: Comparative study of industrial waste water with municipal wastewater, Industrial wastewater problems in India: Effects of discharges of Industrial Waste of Receiving Bodies of Water, Land and Sewer. Effluent and Stream Standards. Historical Development of law related to environmental Protection, Salient feature of Water Act- 1974, Air Act-1981 and Environmental (Protection) Act -1986	7
3	Specific Industrial Treatment Processes: Neutralization, Equalization and Proportioning, Volume and strength reduction	8
4	Raw materials, Water requirements, Process Characteristics, Composition, effects and treatment, flow sheet of Industrial Wastewaters generated from: Textile (Cotton and Synthetic), tannery, Pulp and Paper, Dairy, Metal Plating (Chromium and Cyanide problem), Slaughter house	12
5	Distillery, Dyeing and printing, Fertilizer, Copper & Cement Industry. Provision of various Indian Standards for above Industries	8
6	Potential of Wastewater Recycle and Reuse in Industries, Concept of Common Effluent Treatment Plants	4
	Total	40

Recommended Text / Reference Books:

1. Wastewater Treatment by M. N. Rao and A. K. Datta–Oxford I. B. H publishers
2. Metcalf & Eddy, “Wastewater engineering Treatment disposal reuse”, Tata McGrawHill.
3. Eckenfelder, W.W., “Industrial Water Pollution Control”, McGraw-Hill
4. M.N. Rao and Dutta – Industrial Waste.

Recommended Text / Reference Books:

1. Mark J. Hammer, Mark J. Hammer, Jr., “Water & Wastewater Technology”, PrenticeHall of India.



2. N.L. Nemerrow –Theories and practices of Industrial Waste Engineering.
3. C.G. Gurnham –Principles of Industrial Waste Engineering.

3MEN2-13: WATER QUALITY MODELLING

S. No.	Contents	Contact Hours
1	Introduction :Objective, scope and outcome of the course	1
2	Introduction: concepts of scale in natural systems, brief review of the fate processes in the environment, examples of natural systems, principles of model formulation, calibration, validation, error estimation and sensitivity analysis	7
3	Derivation of generalized mass balance equation for contaminants in incompressible fluid(water) in the non-inertial frame of reference	8
4	River Modelling: one dimensional advection-dispersion-reaction model, river properties and estimation of parameters, different forcing situations (point, non-point, aerial sources and sinks), sediment water interaction	8
5	Estuary Modelling: types and properties, flow characterization, advection-dispersion models, salt gradient box models; Lake Modelling: box models, generalized models, special considerations for large lakes, sediment mixing and interaction with water column	8
6	Wetlands: box models for flow, equilibrium and kinetic geochemical models for red-ox reactions, transport of heavy metals	8
Total		40

Recommended Text Books:

1. Surface Water Quality Modeling by Steven C. Chapra

Recommended Reference Books:

1. Water Quality Modeling for Rivers and Streams by Benedini, Marcello & Tsakiris, George
2. Water Quality Modelling for Rivers, Streams and Estuaries by Dr. R. Manivanan



Course No.	Course Name	L-T-P Credits	Year of Introduction
06CE7033	Seminar II	0-0-2-2	2015

Each student is required to present a technical paper on a subject approved by the department. The paper should be on a recent advancement/trend in the field of Environmental Engineering. He/she shall submit a report of the paper presented to the department.

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CE7043	Project(Phase 1)	0-0-8-6	2015

The thesis (Phase-I) shall consist of research work done by the candidate or a comprehensive and critical review of any recent development in the subject or a detailed report of project work consisting of experimentation/numerical work, design and or development work that the candidate has executed.

In Phase-I of the thesis it is expected that the student should decide a topic of thesis, which is useful in the field or practical life. It is expected that students should refer national and international journals, proceedings of national and international seminars. Emphasis should be given to the introduction to the topic, literature review, and scope of the proposed work along with some preliminary work / experimentation carried out on the thesis topic.

Student should submit Phase-I thesis report in two copies covering the content discussed above and highlighting the features of work to be carried out in part-I of the thesis. Student should follow standard practice of thesis writing.

The candidate will deliver a talk on the topic and the assessment will be made on the basis of the term work and talks there on by a panel of internal examiners one of which will be the internal guide. These examiners should give suggestions in writing to the student to be incorporated in thesis work Phase-II.

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CE7014	Project (Phase 2)	0-0-21-12	2015

In the fourth semester the student has to continue the thesis work and present the report. At the end of successfully finishing the work he / she has to submit a detailed report and has to present for a viva-voce.

The work carried out should lead to a publication in a National / International Conference. They should submit the paper before the evaluation of the thesis and specific weightage will be given to accepted papers in reputed conferences.