

SHRI VENKATESHWARA UNIVERSITY



Syllabus

For

M.Tech. (Environmental Engineering)

(Effective from the Session: 2019-20)

Shri Venkateshwara University, Gajraula, Uttar Pradesh
Course and Evaluation Scheme for M. Tech. Course
(Environmental Engineering)

(Effective from session 2019-2020)

SEMESTER I

S. No	Subject Code	Name of the Subject	Periods			Credit	Evaluation Scheme					Subject Total
			L	T	P		Theory			Practical		
							CT	TA	ESE	TA	ESE	
1	MEV-101	Environmental Chemistry and Microbiology	3	0	0	3	20	10	70	--	--	100
2	MEV-102	Water Treatment & Supply Systems	3	0	0	3	20	10	70	--	--	100
3	MEV-015	Groundwater Contamination And Remediation	3	0	0	3	20	10	70	--	--	100
4	MEV 022	Hydrology And Hygrometry	3	0	0	3	20	10	70	--	--	100
5	MLC- 101	Research Methodology and IPR	3	0	0	3	20	10	70	--	--	100
6	MEV-151	Environmental Engineering Lab-I	--	--	3	2	--	--	--	20	30	50
7	MEV-152	Environmental Engineering Lab-II	--	--	2	1	--	--	--	20	30	50
8	AUD-101	English for Research Paper Writing	2	0	0	0	-	-	-	-	-	-
TOTAL						18						600

SYLLABI OF SUBJECTS for M.Tech. Ist Semester

L	T	P	
3	0	0	

MEV-101 Environmental Chemistry and Microbiology

Introduction, Basic Concepts from General Chemistry, Colloidal Chemistry, Environmental Biochemistry, Physico-Chemical and Biological examination of Water and Wastewater, Thermodynamics of Microbial systems, Mass and energy Balance of Microbial Process, Aerobic and Anaerobic Microbial growth.

TEXT BOOKS:

1. Benefield D. L., Judkins F. J., Weand L. B., Process Chemistry for Water and Wastewater Treatment, 1st Edition, Prentice Hall, 1982
2. Bitton, G., Wastewater Microbiology, 3rd Ed., Wiley, 2005
3. Mitchell, R., and Gu, J.D., Environmental Microbiology, 2nd Ed., Wiley-Blackwell, 2010
4. Sawyer, C. N., McCarty, P. L., and Perkin, G.F., Chemistry for Environmental Engineering and Science, 5th edition McGraw-Hill Inc., 2002

L	T	P
3	0	0

MEV-102 Water Treatment & Supply Systems

Introduction and Sources of Water, Population Forecasting and Water Requirement, Physical, Chemical and Biological Water Quality Parameters, Solid Separation, Settling Operation, Coagulation, Softening, Filtration, Disinfection, Desalination, Dissolved Solids Removal, Adsorption and Ion Exchange, Electrolysis, Osmosis, Special Treatments, Pumping and Distribution Systems.

TEXT BOOKS:

1. Water and Wastewater Engineering: Water Supply and Wastewater Removal- by Fair, Geyer and Okum. - John Wiley & Sons Canada, Limited
2. Physicochemical Processes: For Water Quality Control by W.J. Weber - John Wiley & Sons, 1972

REFERENCE BOOKS:

1. Unit operations of Sanitary Engineering by linvil rich- Wiley, New York, 1961
2. Water and Wastewater Technology by Hammer Mark J., Hammer Mark J. - Prentice- Hall New Arrivals.

MEV-015 Groundwater Contamination and Remediation

Introduction, hydrologic Cycle, Groundwater Contaminant and Transport Mechanism, Data collection Methods: Introduction, Geological data acquisition and Hydrological data acquisition, acquisition of soil and groundwater quality data, Groundwater Remediation, Sorption and other chemical reactions, Flow and transport in the Unsaturated Zone, Non-aqueous phase Liquids: Characterization, types, remediation at sites.

Water Harvesting: Types of storage structures, water yield from catchments, runoff diversion, pond and reservoirs, earth embankments.

TEXT BOOK:

1. Ground water contamination (Transport and remediation) - Philip.B.Bedient, Hanadi.S. Rifai & Charles.J.Newell Publishers: Prentice Hall.

Course Outcomes:

At the end of this course, students will be able to

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today’s world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.

Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

<p>Unit 1: INTRODUCTION Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations</p>
<p>Unit 2:Effective literature studies approaches, analysis Plagiarism, and Research ethics</p>
<p>Unit 3: Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee</p>
<p>UNIT 4: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development.International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.</p>
<p>Unit 5:Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.</p>
<p>Unit 6:New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.</p>

References:

- Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students”
- Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”
- Ranjit Kumar, 2nd Edition, “Research Methodology: A Step by Step Guide for beginners”
- Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd, 2007.
- Mayall, “Industrial Design”, McGraw Hill, 1992.
- Niebel, “Product Design”, McGraw Hill, 1974.
- Asimov, “Introduction to Design”, Prentice Hall, 1962.
- Robert P. Merges, Peter S. Menell, Mark A. Lemley, “Intellectual Property in New Technological Age”, 2016.
- T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

MEV-022 Hydrology and Hygrometry

Introduction: Historical background, Hydrological cycle, forms of precipitation, its Arial and time variation, missing records, hydrological abstraction, runoff, hydrograph analysis, unit hydrograph, IUH, Nash and Clarke models. Rainfall runoff models, black-box type and physics based models.

Statistical Methods: Correlation coefficient, curve fitting, regression analysis, multiple regression. Various distribution and their use in hydrology, plotting positions, frequency factors, extreme value theory. Generation of random numbers and synthetic data when persistence is absent.

Flow Generation: Stochastic processes, their classification, time series and its components, correlogram, autoregressive processes. Synthetic generation of yearly and monthly flows in hydrology.

Floods and Droughts: Flood estimation by various methods, design for various hydraulic structures, flood forecasting, droughts.

Population growth models, engineered transport systems: Population Growth models- Regional growth models; engineered transport systems-Pipe network analysis- water distribution system- Domestic waste water collection-storm water collection system

Treatment process, Individual household systems: Treatment- Lagoon systems-Renovation Systems

TEXT BOOKS:

1. Sincero and Gregoria, Environmental Engineering: A Design Approach, PHI Learning, 2009
2. Schnoor, J.L., Environmental Modelling: Fate and Transport of Pollutants in Water, Air and Soil, John Willey and Sons, 1996
3. Rich, L.G., Environemntal Systems Engineering, McGraw Hill Inc., 1975

PRACTICAL COURSES

MEV-151 ENVIRONMENTAL ENGINEERING LAB-I (Wet Lab)

Group A

1. To determine the chlorine demand and residual chlorine in water.
2. To estimate the hardness of the given water sample.
3. To estimate the total solids, total dissolved solids and volatile solids of the given water sample.
4. To determine cations (Na, K, Li) and anions (sulfate, nitrate, fluoride).
5. To determine MPN count - total and fecal.
6. To estimate the chloride concentration of the given water sample

Group B

1. To determine the COD of the given sample.
2. To verify Class I sedimentation.
3. To determine the sludge volume index (SVI) of the given sludge sample.
4. To determine Heavy Metals (Pb, Cr, As, CN, Cd) in waste water.
5. To determine phenol compounds and total/kjeldahl nitrogen in wastewater.
6. To determine total phosphate in wastewater.

Field visit of water treatment plant.

NOTE:

From the above list of experiments minimum 4 experiments are required to be done from each group for the completion of practical course along with compulsory field visit.

Readings:

1. Standard methods for the examination of water and wastewater, 21st Edition, Washington: APHA., 2012

2. Sawyer, C. N., McCarty, P. L., and Perkin, G.F., Chemistry for Environmental Engineering and Science, 5th edition McGraw-Hill Inc., 2002
3. B. Kotaiah and Dr. N. Kumara Swamy, Environmental Engineering Laboratory Manual, Charotar Publishing House Pvt. Ltd., 1st Ed., 2007
4. Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, Environmental Engineering, McGraw Hill Inc., New York. 1995

MEV-152 ENVIRONMENTAL ENGINEERING LAB-II (Dry Lab)

Group A

1. Monitoring of ambient air quality for total suspended particulate matter and respirable SPM.
2. Measurement of CO, HC, H₂S and NH₄ in exhausts.
3. Measurements of SO₂ and NO_x in ambient air.
4. Detection of levels of noise pollution in residential/commercial/industrial and silent/sensitive areas of Lucknow city.
5. Demonstrate the feasibility of the geolocation of a sound source by simultaneous noise power measurements
6. Demonstrate, with a bell jar, that a material medium such as air is needed for transmission of sound waves
7. Determine the relationship between air pressure and sound decibel.

Field visit of Industrial/wastewater treatment plant and stack monitoring by BIS/EPA methods

Group B (Software)

Design of water supply and sewerage systems using WATER CAD and SEWER CAD and design of other environmental systems using HYDRUS, MODFLOW VISUAL, MATLAB, ORIGIN, Arc GIS, GWM, Air MOD, SPSS, PSPP, JASP and other statistical software.

NOTE:

From the above experiments minimum 4 experiments are required to be done from Group A and Group B respectively. For the completion of practical course mandatory field visit is required along with field visit report.

TEXT BOOKS:

1. Metcalf & Eddy, Inc., Waste water Engineering Treatment and Reuse, McGraw Hill Inc., New Delhi., 2003
2. Air pollution: its origin and control by Kenneth Wark, Cecil Francis Warner, Wayne T. Davis - John Wiley & Sons Inc

AUDIT 1 : ENGLISH FOR RESEARCH PAPER WRITING AUD -101

Course objectives:

Students will be able to:

1. Understand that how to improve your writing skills and level of readability
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

SYLLABUS CONTENTS

- Planning and Preparation, Word Order, Breaking up long sentences, Structuring
- Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness.
- Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising,
- Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction.
- Review of the Literature, Methods, Results, Discussion, Conclusions.
- The Final Check. key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions.
- Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook .
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

