

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Scheme of Teaching & Examination

Master of Engineering in Environmental Science and Engineering (Part Time)

First Semester:

S.No.	Code	Board of Studies	Subject	Periods per week			Scheme of Exam			Total	Credits L+ (T+P)/2
				L	T	P	Theory / Practical				
							ESE	TA	CT		
1	653111(53)	Environmental Science & Engg.	Principles of Environmental Engineering	3	1	-	100	20	20	140	4
2	653112 (53)	Environmental Science & Engg.	Fundamental Environmental Science	3	1	-	100	20	20	140	4
3	653113 (53)	Environmental Science & Engg.	Environmental System Optimisation	3	1	-	100	20	20	140	4
4	653121 (53)	Environmental Science & Engg.	Fundamental Environmental Science Lab	-	-	4	100	80	-	180	2
Total				9	3	4	400	140	60	600	14

L = Lecture, T = Tutorial, P = Practical or Term Work

Each period of 50 minutes, with 4 periods per day (6 to 9.20 PM) for six days in a week

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Semester: M.E. I Sem.
Total Theory Periods: 40
Total Marks in End Semester Exam: 100
Minimum number of class tests to be conducted: 02

Subject: Principles of Environmental Engineering
Specialization: Environmental Science & Engg.
Code: 653111 (53)
Total Tutorial Periods: 12

Unit 1

History of Environmental Pollution and its control, Population, economic growth, industrialization urbanization and energy-use, as causes of environmental pollution. Air quality and emission standards classification of air pollutants;

Unit 2

Fundamentals of aerosol behaviour – sedimentation, inertial impaction, convective diffusion; fundamentals of gaseous pollutant behavior – adsorption, absorption.

Unit 3

Water quality and effluent standards, physical chemical and biological water quality parameters. Processes in Natural Water systems. Dissolved oxygen models; Pathogen Indicator models

Unit 4

Solid – waste generation, properties and composition; solid – waste management systems.

Unit 5

Environmental engineering calculations. Mass and energy balance for environmental engineering systems under steady state and unsteady state conditions.

TEXT

1. G.M.Masters, Introduction to Environmental Engineering & Science, Prentice Hall, New Delhi, 1997
2. J.G. Henry and G. W. Heike, Environmental Science & Engineering”, Prentice Hall International Inc., New Jersey, 1996.

REFERENCE

1. H.S. Peavy, D.R. Rowe, G. Tchobanoglous, Environmental Engineering, McGraw Hill, 1985.
2. S.K. Friedlander: Smoke Dust and Haze: Fundamentals of Aerosol Behaviour, Wiley 1977.
3. Metcalf and Eddy: Wastewater Engineering – Treatment Disposal and Reuse, 6th Edition Tata McGraw Hill, 1995.
4. Reible D.D.: Fundamentals of Environment Engineering, Lewis Publishers, 1999.

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Semester: M.E. I Sem.
Total Theory Periods: 40
Total Marks in End Semester Exam: 100
Minimum Number Of Class Tests To Be Conducted: 02

Subject: Fundamentals of Environmental Science
Specialization: Environmental Science & Engg.
Code: 653112 (53)
Total Tutorial Periods: 12

Unit 1

General Chemistry, Environmental Chemistry of Water, Water pollution, Water Treatment Atmospheric Chemistry, Inorganic and Organic air pollutants, Chemistry of Hazardous substances, Toxicological Chemistry.

Unit 2

Basic concept of instrumental methods of pollutant analysis such as Ion Selective Electrode, Atomic Absorption Spectrometry, Flame Photometry, Chromatography, Mercury Analyser.

Unit 3

The life support system, chemical composition of cells, Structure and Classification of Microorganisms, Nutrition and Growth, Energy generation and utilization in biological systems, Pathways of metabolism, Aerobic response to changes in the environment, pathogenic microorganisms, Role of Biotechnology for handling recalcitrant and toxic pollutants.

Unit 4

Basic concepts of ecology; ecosystem, energy flow, food chains and trophic structure indices, limiting factors, population dynamics, development and evaluation of ecosystems, case studies on some ecological problems relevant to India.

Unit 5

Environmental hazards and their management, Geochemistry, Soil Chemistry, air pollutants, water pollutants.

TEXT

1. S. E. Manahan, Fundamental of Environmental Chemistry, Lewis, 1993.
2. C.N. Sawyer, P.L. McCarthy and G.F. Parkin, Chemistry for Environmental Engineering, McGraw Hill, 1994.
3. P. K. Pandey and D. Gupta, Environment and Ecology, Sun India, 2005.

REFERENCE

1. H.H. Willard, L.L. Merrit and J.A. Dean, Instrumental Methods of Analysis, Von Nostrand, 1976.
2. R.M. Sterritt, J.N. Lester, Microbiology for Environmental and public Health Engineers, Ed. F.N. Spon Ltd. 1988.
3. N.F. Gray, Biology of Wastewater Treatment, Oxford University Press, 1989.
4. R. Socolow, C. Andrews, F. Berkhont and V. Thomas. Industrial Ecology and Global change, Cambridge University, 1994.
5. Meyers A. Robert (Eds.) Encyclopedia of Environmental Analysis and Remediation Vol. 1-8, John Wiley & Sons, 1998.
6. American Water Works Association, Water Quality Control & Treatment, McGraw Hill, 1990.

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Semester: M.E. I Sem.
Total Theory Periods: 40
Total Marks in End Semester Exam: 100
Minimum Number Of Class Tests To Be Conducted: 02

Subject: Environmental System Optimization
Specialization: Environmental Science & Engg.
Code: 653113 (53)
Total Tutorial Periods: 12

Unit 1

Formulation and Analysis of Environmental Systems, Mathematical modeling and optimisation. Optimisation and Algorithms; Methods of Lagrange Multipliers, Unconstrained and constrained optimisation, sequential search algorithms; Box's Algorithms;

Unit 2

Linear Programming models; simplex method; separable and integer programming; assignment problems for each topic

Unit 3

Transportation models and Dynamic programming models; assignment problems for each topic.

Unit 4

CPM and PERT in Environmental decision-making. Uses of analytical techniques in Chemical Warfare and Biological Warfare control, detection, identification, and emergency response measures to deal with intended or unintended releases and escape, and security measures to protect and control stockpiles.

Unit 5

Application of Optimisation techniques in wastewater management systems, water supply and waster water collection systems, agriculture non point source pollution problem, air pollution control and management systems, solid waste collection etc.

TEXT

1. D.A. Haith, Environmental systems optimization, John Wiley 1982.
2. S.S.Rao, Optimization Theory and Application, Wiley Eastern, 1978.

REFERENCE:

1. Reible D.D.: Fundamentals of Environment Engineering, Lewis Publishers, 1999.
2. Lapidus, L. and Pinder, G., Numerical Solutions of Partial Differential Equations in Science & Engineering, Wiley, New York 1982.

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Semester: M.E. I Sem.

Total Practical Periods: 50

Total Marks in End Semester Exam: 100

Minimum Number Of Class Tests To Be Conducted: 02

Subject: Fundamentals of Environmental Science - Lab

Specialization: Environmental Science & Engg.

Code: 653121 (53)

PRACTICAL ON FUNDAMENTALS OF ENVIRONMENTAL SCIENCES

1. DETERMINATION OF DISSOLVE OXYGEN AND CARBON DIOXIDE.
2. DETERMINATION OF CALCIUM AND TOTAL HARDNESS.
3. ESTIMATION OF B.O.D.
4. STUDY OF ACIDITY AND ALKALINITY OF WATER .
5. ESTIMATION OF HEAVY METALS IN GIVEN WATER SAMPLES.
6. DETERMINATION OF PHYSICAL PROPERTIES OF WATER
7. A) DENSITY B) PH
8. C) SURFACE TENSION D) TURBIDITY E) CONDUCTANCE.
9. CHROMATOGRAPHIC SEPARATION OF COMPOUNDS.
10. DETERMINATION OF CU, NI, AND CO IN SOLUTION BY SPECTROPHOTOMETRY.
11. DETERMINATION OF AVAILABLE CHLORINE/ FREE CHLORINE/CHLORIDE IN GIVEN WATER SAMPLES.

TEXT

1. H.H. Ramp and H. Krist, Laboratory manual for the Examination of water, waster water and soil, VCH Publishers, 1988.
2. S.S. Dara, Experiments and Calculations in Environmental Chemistry, S.Chand, 2000.
3. G.M.Masters, Introduction to Environmental Engineering & Science, Prentice Hall, New Delhi, 1997