

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

### **Scheme of Teaching & Examination**

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

#### **Fourth Semester:**

S.No.	Code	Board of Studies	Subject	Weekly Teaching Periods			Scheme of Exam			Total	Credits L+ (T+P)/2
				L	T	P	Theory / Practical				
							ESE	CT	TA		
1	653411(53)	Environmental Science & Engineering	Environmental Systems and Modelling	4	2	-	100	20	20	140	5
2	653412 (53)	Environmental Science & Engineering	Modern Trends in Environmental Engineering	4	2	-	100	20	20	140	5
3	Refer Tabel – II		Elective – II	4	2	-	100	20	20	140	5
4	653421(53)	Environmental Science & Engineering	Environmental Systems and Modelling Lab	-	-	6	100	-	80	180	3
<b>Total</b>				<b>12</b>	<b>6</b>	<b>6</b>	<b>400</b>	<b>60</b>	<b>140</b>	<b>600</b>	<b>18</b>

**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**

<b>Table - II</b>			
<b>Elective - II</b>			
S.No.	Code	Board of Studies	Subject
1	653431 (53)	Environmental Science & Engineering	Natural & Industrial Disaster Management
2	653432 (53)	Environmental Science & Engineering	Remote Sensing and GIS application in Environmental Engg.
3	653433 (53)	Environmental Science & Engineering	Environmental Geo-technology & Land Management

Note (1) 1/4th of total strength of students subject to minimum of twenty students is required to offer an elective in the college in a particular academic session

Note (2) Choice of an elective course once made for an examination cannot be changed in future examinations.

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C. G.)

**Semester:** M.E. IV Sem.

**Total Theory Periods:** 50

**Total Marks in End Semester Exam:** 100

**Minimum number of class tests to be conducted:** 02

**Subject:** Environmental Systems and Modelling

**Specialization :** Environmental Science & Engg.

**Code:** 653411 (53)

**Total Tutorial Periods:** 28

- Unit – 1** Definition, Classification, Examples and Models of Environmental Systems.
- Unit – 2** Introduction to air quality models; Air pollution meteorology; Atmospheric turbulence; Gaussian Plume model and Modifications; Simulations of special meteorological and topographic conditions; urban diffusion models, Model Calibration. Sensitivity Analysis, Applications,
- Unit - 3** Climate change and the Models for Climatic change
- Unit – 4** Introduction to river, estuarine and lake hydrodynamics, Dissolved Oxygen Models; Temperature Models, prediction of fate of organism and toxic substances.
- Unit – 5** Models for management applications.

## TEXT

1. R.V. Thompson and J.A. Muller Principles of Surface water Quality Modeling and Control Harper International Edition, N.D. 1987.
2. Richard W. Boubel, Donald L. Fox, D. Bruce Turner and Arthur C. Stera: Fundamentals of Air Pollution, Academic Press, 1994.
3. J.H. Seinfeld: Air Pollution, Physical and Chemical fundamentals, McGraw Hill 1990.

## REFERENCES

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.

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C. G.)

**Semester:** M.E. IV Sem.

**Subject:** Modern Trends in Environmental  
Science and Engg.

**Total Theory Periods:** 50

**Specialization:** Environmental Science & Engg.

**Total Marks in End Semester Exam:** 100

**Code:** 653412 (53)

**Minimum number of class tests to be conducted:** 02

**Total Tutorial Periods** 28

**Unit – I** Emerging fields in ESE: Cleaner Production Technologies, Environmental Bio-Technology, Bioremediation, Risk Analysis, Software and Information Systems, Global Issues.

**Unit – II** Environmental pollution monitoring sensors. Basic understanding of the interaction of electromagnetic radiation, sound, laser etc. with matter. Familiarization with a variety of sensors and platforms

**Unit –III** Anthropogenic Endocrine Disruption. The Scientific Basis of the Endocrine Hypothesis. Scientific Uncertainty, Risk Analysis and Policy Response

**Unit – IV** Land pollution- Definition and scope, necessity and importance, Treatment methods: Various methods of refuse processing, fertilizer, fuel and food values. Sanitary land filling - definition, methodology, trench, area, ramp, pit method, site selection, basic steps involved, cell design, prevention of site pollution, Leachate treatment, gas collection and recirculation.

**Unit – V** Composting – Aerobic and anaerobic composting, Factors affecting composting indore and Bangalore processes of composting. Incineration - Processes 3Ts to control high temperature incinerators, design approach prevention of air pollution.

## **Text**

Special issue and reviews articles on the relevant topics in Science, Scientific American, Nature, Current Science and Environmental Science and Engineering.

C.S. Foster and D.A. Johnwase, Environmental Biotechnology, (Ellis Harwood) (1987).

B. Vallely, '1001Ways to Save the Planet', (Ivy Books) Newyork (1990)

## **REFERENCE**

1. Solid Waste Management , Van Nostrand Reinhold Co. 1975.
2. C.L. ell, Solid Waste Management, John Wiley, 1975.
3. P.W. Powers. How to dispose of toxic substances and industrial Waste, Noyes Data Corporation, England, 1976.

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C. G.)

**Semester:** M.E. IV Sem.

**Total Theory Periods:** 50

**Total Marks in End Semester Exam:** 100

**Minimum number of class tests to be conducted:** 02

**Subject:** Natural & Industrial Disaster Management

**Specialization :** Environmental Science & Engg.

**Code:** 653431 (53)

**Total Tutorial Periods:** 28

- Unit – I** Introduction, natural and anthropogenic accidents and disasters. Objectives of Assessment, Evolving Objectives of Assessment, The Assessment Process, Assessments for Different Disaster Types, How Assessment Data is Used.
- Unit – II** Storage, handling, transportation, and disposal of hazardous materials. Hazardous Wastes: Exposure and risk assessment, environmental legislation, characterization and site assessment.
- Unit – III** Waste minimization and resource recovery, chemical physical and biological treatment, thermal process transportation, storage ground water contamination landfill disposal. Injection well disposal, process selection and facility siting site remediation.
- Unit – IV** Major natural disasters: earthquake, cyclones, floods, droughts, and epidemics. Rehabilitation measures.
- Unit – V** Major hazard installations, Disaster preparedness and its management. Public health hazards. Forests Related Disasters, Wind and Water Driven Disasters, Mining disaster, Technological Disasters.

## TEXT

1. Heinrich, H.W. Industrial Accident prevention, 2000.
2. Wentz, C.A., Hazardous Waste Management, McGraw Hill, 1989
3. Encyclopedia of Occupational Health and Safety Vol. 1-2, National Safety Council.

## REFERENCE

1. Meyers A. Robert (Eds.) Encyclopedia of Environmental Analysis and Remediation Vol. 1-8, John Wiley & Sons, 1998.
2. C.A. Wentz, Hazardous Waste Management, McGraw Hill, 1995 Second Edition.
3. H.M. Freeman, Standard Handbook of Hazardous Waste Treatment and Disposal McGraw Hill, 1989.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI  
(C. G.)**

**Semester:** M.E. IV Sem.

**Subject:** Remote Sensing and GIS Applications  
in Environmental Engg.

**Total Theory Periods:** 50

**Specialization :** Environmental Science & Engg.

**Total Marks in End Semester Exam:** 100

**Code:** 653432 (53)

**Minimum Number of Class Test to be Conducted :** 02

**Total Tutorial Periods:** 28

**Unit – I**

**FUNDAMENTALS OF REMOTE SENSING:** Definition, Physics of Remote Sensing, Electromagnetic Radiation and its interactions with atmosphere, Spectral reflectance of earth materials and vegetation

**Unit – II**

**PLATFORMS AND SENSORS:** Aerial Photographs, Active and passive sensors, Data products, Various satellites in orbit and their sensors.

**Unit – III**

**DATA PROCESSING:** Data analysis - Visual Interpretation and Digital Image Processing – classification.

**Unit – IV**

**GIS:** Introduction to GIS, concepts and Data base structure, various GIS softwares.

**Unit – V**

**REMOTE SENSING AND GIS APPLICATIONS:** Management and monitoring of land, air, water and pollution studies, conservation of resources, coastal zone management - Limitations.

**Text Books:**

Lillies and T.M. and Kiefer, R.W., " Remote Sensing and Image Interpretation ", John Wiley and Sons, 1994.

Burrough, P.A. and McDonnell, R.A., " Principles of Geographical Information Systems ", Oxford University Press, 1998.

**Refernce Books:**

*Lintz, J. and Simonet, " Remote Sensing of Environment ", Addison Wesley Publishing Company, 1994.*

# CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C. G.)

**Semester: M.E. IV Sem.**

**Subject: Environmental Geotechnology and  
Land Management**

**Total Theory Periods: 50**

**Specialization : Environmental Science & Engg.**

**Total Marks in End Semester Exam: 100**

**Code: 653433 (53)**

**Minimum Number of Class Test to be Conducted :02**

**Total Tutorial Periods: 28**

## **Unit – I**

Environmental geotechnology – its importance and scope. Earth resources – renewable and non-renewable. Formation of rocks, their common types; composition and physical properties. Weathering, erosion, transportation, deposition, structural relations and formation of landforms.

## **Unit - II**

Concept of geological time scale. Geological studies required for safety and long life of dams and reservoirs, highways, tunnels and buildings.

## **Unit - III**

Geotechnical studies for constructing roads on hill slope and safe waste disposal; Impact of geological and geographical characteristics on human life. Mining and geo-environment; environmental impacts of geological hazards: earthquake, landslides, floods and dams. Impacts of various human, industrial and natural activities on soil and their management.

## **Unit - IV**

Concept of land-use and land-use planning. Land degradation due to human and industrial activities. Principles and procedures of land protection and management. Preparation of consequence maps and consequence charts. Principles of land use planning.

## **Unit - V**

Characterisation of soil and classification of degraded land. Reclamation of degraded land. Soil enrichment for bio-reclamation of degraded land. Soil plant animal combination for speedy reclamation, financial aspects of land management, Geo-ecological reconstruction of mining degraded lands.

## **Text Books:**

1. Physical Methods of Soil Characterisation – J. Behari (Narosa Publishing Hall, New Delhi)
2. Environmental Geology – DR Coates, John Wiley & Sons, NY 1981

## **References:**

1. Design Aids in Soil Mechanics and Foundation Engineering – S.R. Kaniraj (Tata McGraw Hill, New Delhi)
2. The State of India's Environment: A Citizen Report – Anil Agarwal, Vol 1 & 2, 1985.
3. Textbook of Soil Science – Biswas and Mukherjee, TMH, New Delhi, 1994.
4. Reclaimed Land, Erosion Controls, Soils and Ecology – Martin J Haigh(ed), A Balkema, 2000.

**CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,  
BHILAI (C. G.)**

**Semester: M.E. IV Sem.**

**Total Practical Periods: 72**

**Total Marks in End Semester Exam: 100**

**Minimum Number of Class Test to be Conducted :02**

**Subject: Environmental Systems and Modelling Lab**

**Specialization : Environmental Science & Engg.**

**Code: 630421 (19)**

**Total Tutorial Periods: 28**

**List of Experiments to be conducted:**

1. Analyze and modeling of selected problems and design of algorithms appropriate to their solution
2. Usage of conceptual, mathematical and computational models.
3. Manipulation of environmental data files on a personal computer.
4. Graphical representation of environmental data and to draw inferences from them.
5. To study the differences between analytical and numerical solutions to environmental models.
6. Use of iteration technique in environmental modeling
7. To study the comparison between discrete and continuous models.
8. To validate a model and sensitivity analysis.
9. To understand the concept of spatial dependence and its modeling.

**Text Book:**

R.V. Thompson & J.A. Muller, "Principles of Surface Water Quality Modeling and Control", Harper International Ed., New Delhi, 1987.

**List of Equipment:**

Personal Computers with PIV processor and at least 256 MB RAM supported by MATLAB, MODFLOW, MODPATH, MT3D, RT3D, FEMWATER, and SEEP2D.