

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD

ESSENTIALS OF ENVIRONMENT AND SEISMIC ENGINEERING

1. RATIONALE

Since last two decades, Environmental Education has attracted the interests of educationalists and practitioners at all levels of education throughout the World. The growing concern about the natural resources degradation, air & water pollution, deforestation and other environmental problems has prompted educationalists to introduce a course on Essentials of Environment in various technical Curricula. As technicians occupy middle level managerial positions in industries, it is essential that they are provided with right kind of environmental education and training. It is with this aim that a course on " Essentials of Environment" is being introduced in diploma programme.

2. SCHEME OF TEACHING :

TOPIC NO	NAME OF TOPIC	TH	PR	TOTAL
1	Introduction	02	--	02
2	Ecological aspects of environment	05	--	05
3	Natural resources	07	--	07
4	Global environmental problems	05	--	05
5	Environmental pollution	07	--	07
6	Clean Technologies	05	--	05
7	Fundamentals of seismic engineering	08	--	08
8	Natural Disasters	03	--	03
	Total	42	--	42

3. OBJECTIVES :

In view of developing new attitudes and behavioral patterns to enable students make decisions which help preventing deterioration of environment & as certain concept of sustainable development, the following objectives for Essentials of Environment course have been identified:

- 1.1 Understand the scope of Environmental education.
- 1.2 Understand the importance of environmental awareness.
- 2.1 Understand the natural system.
- 2.2 Understand a biotic and biotic components of natural system.
- 2.3 Understand various processes of natural system.
- 2.4 Appreciate Eco system, food chain & webs and other biological Systems.
- 2.5 Estimate future ecological prospects of man.
- 3.1 Know the natural resources.
- 3.2 Assess the impact of human population on environment.
- 3.3 Understand abiotic and biotic resources.

- 3.4 Appreciate forest as natural resource.
- 3.5 Recognize the concept of sustainable development.
- 3.6 Appreciate the importance of management, consumption & conservation of natural resources.
- 4.1 Create awareness for Global Environmental problems.
- 5.1 Understand causes of environmental pollution.
- 5.2 Understand water pollution.
- 5.3 Understand air pollution.
- 5.4 Understand the Noise as pollutant.
- 5.5 Know radiation and its pollution effects.
- 6.1 Understand clean technology.
- 6.2 Recognize the importance of waste minimization.
- 6.3 Know importance of bio-fertilizers.
- 6.4 Understand the Integrated Pest Management (IPM) system.
- 7.1 Understand the need of seismic engineering.
- 8.1 Understand the various types of natural disaster.

4. TOPICS & SUB-TOPICS

1. INTRODUCTION

- 1.0 Introduction
- 1.1 Environment & its components
- 1.2 Environment in India
- 1.3 Public awareness

2. ECOLOGICAL ASPECTS OF ENVIRONMENT

- 2.0 Introduction to Environment
- 2.1 Ecology
 - 2.1.1 Eco system
 - 2.1.2 Factors affecting Eco system
- 2.2 Elton pyramid
- 2.3 Biogeochemical cycles.
 - 2.3.1 Hydrologic cycle
 - 2.3.2 Carbon cycle
 - 2.3.3 Nitrogen cycle
 - 2.3.4 Phosphorus cycle
 - 2.3.5 Sulphur cycle
- 2.4 Biodiversity
 - 2.4.1 Biodiversity Index
- 2.5 Future of human being

3. NATURAL RESOURCES

3.0 Natural Resources

3.1 Types of resources

3.2 Quality of life

3.3 Population and Environment

3.4 Water resources

3.4.1 Sources of water

3.5 Population projection

3.5.1 Arithmetic progression method

3.5.2 Geometric progression method

3.5.3 Incremental Increase method

3.5.4 Logistic curve method

3.5.5 Declining growth method

3.6 Water demand

3.7 Forest as resource

3.7.1 Forest and Environment

3.7.2 Deforestation

3.7.3 Afforestation

3.7.4 Forest conservation, its methods

3.8 Land

3.8.1 Uses and abuses of waste and wet land

3.9 Wild life

3.9.1 Conservation of wild life

3.9.2 Important National parks, Safaries, Reserves.

3.10 Other resources

3.10.1 Oil and mineral resources

3.10.2 Their depletion

3.10.3 Effects

4. GLOBAL ENVIRONMENTAL PROBLEMS

4.0 Introduction

4.1 Major Global problems

4.2 Acid rain

4.2.1 Effect of Acid rain

4.3 Green house effect

4.4 Depletion of Ozon layer

4.4.1 Effect of Ozon layer depletion

4.5 Human predictiments

4.5.1 Introduction of global warming

4.5.2 Measures against global worming

5. ENVIRONMENTAL POLLUTION

- 5.0 Introduction
- 5.1 Water pollution
- 5.2 Characteristics of domestic waste water.
- 5.3 Principles of treatment
- 5.4 Water treatment plant
- 5.6 Air pollution
 - 5.6.1 Pollutants
 - 5.6.2 Sources of pollution
 - 5.6.3 Effect of pollutants
 - 5.6.4 Air monitoring system
 - 5.6.5 Air pollution control
- 5.7 Noise pollution
 - 5.7.1 Acoustic treatment for noise pollution
 - 5.7.2 Place of noise pollution
 - 5.7.3 Effect of noise pollution
- 5.8 Radio active pollution
 - 5.8.1 Radiation
 - 5.8.2 Adverse effects of radiation & thermal pollution

6. CLEAN TECHNOLOGIES

- 6.0 Introduction
- 6.1 Clean technology
- 6.2 Types of Energy
 - 6.2.1 Conventional Energy Sources
 - 6.2.2 Non-conventional Sources of Energy
- 6.3 Recycling pollution control
- 6.4 Types of Pesticides
- 6.5 Integrated Pest Management

7 FUNDAMENTALS OF SEISMIC ENGINEERING

- 7.1 Introduction
 - 7.1.1 Definition
 - 7.1.2 History of earthquake
 - 7.1.3 Earth and its' structure
- 7.2 Terminology
 - 7.2.1 Epicenter
 - 7.2.2 Hypocenter
 - 7.2.3 Focus
 - 7.2.4 Epicenter distance
- 7.3 Waves generated due to earthquake
 - 7.3.1 P waves
 - 7.3.2 S waves
- 7.4 Causes of earthquake
- 7.5 Measurement of earthquake

- 7.5.1 Intensity and magnitude of earthquake
- 7.5.2 Sysmo-graph
- 7.5.3 Sysmo-scope
- 7.5.4 Sysmo-meter
- 7.5.5 Richter scale
- 7.6 Zoning of earthquake as per I.S.
- 7.7 Effects of earthquake on
 - 7.7.1 Soil
 - 7.7.2 Low-rise and high-rise buildings
 - 7.7.3 Human psychology
 - 7.7.4 Communication
 - 7.7.5 Geology
- 7.8 General instructions for protection of people during earthquake
- 7.9 General guidelines for construction and maintenance of earthquake proof /resistant masonry structure

8 NATURAL DISASTERS

- 8.1 Types of natural disaster
 - 8.1.1 Cyclone
 - 8.1.2 Flood
 - 8.1.3 Fire
 - 8.1.4 Desert storms
 - 8.1.5 Land slides
 - 8.1.6 Snow avalanches
- 8.2 Cyclone
 - 8.2.1 Introduction
 - 8.2.2 Fundamentals
 - 8.2.3 Characteristics
 - 8.2.4 Causes & effects
 - 8.2.5 Preventive and Remedial measures
- 8.3 Flood
 - 8.3.1 Introduction
 - 8.3.2 Fundamentals
 - 8.3.3 Causes and effects
 - 8.3.4 Preventive and Remedial measures
- 8.4 Fire
 - 8.4.1 Fundamentals
 - 8.4.2 Causes & effects
 - 8.4.3 Preventive and remedial measures

5.SUGGESTIVE INSTRUCTIONAL STRATEGIES:

SR. NO.	OBJECTIVES	INSTRUCTIONAL STRATEGY	KEY RESOURCES NEEDED
1	1.1, 1.2	Lecture	Encyclopedia of Environmental Education and Administration
	2.1 to 2.5	Use charts, Slides Films	Film on Environmental Problems
	3.1 to 3.6	Explain with live examples	Case studies on environmental protection
	4.1	News Paper cuttings	Pollution control Board Laboratory
	5.1 to 5.5	Live demonstrations/ field laboratory visits	-----
	6.1 to 6.4	Use AV Aids	----
	7.1 to 8.4	Use IS codes, rules norms framed by Govt. of .India.	Codes on Environmental protection Acts and rules (Central and State)

Note : The above instructional strategies are only suggestive.The individual teacher is free to design his own strategy looking to the constraints and resources available.

6. REFERENCES :

1. Environmental Engineering by Pandy & Carney, TMH, New Delhi.
2. Environment Administration Law and Judicial attitudes.
3. Introduction to Environmental Engineering and Science by Gilber M. Masters, Printers Hall India, New Delhi.
4. Waste Water Engineering - Treatment, Disposal & re-use by Metcalf & Eddy, 2nd edition, TMH, New Delhi.
5. Environmental Engineering by Peavy, TMH International, New York.
6. Video - films developed by Centre for Environmental Education, Thaltej Tekra Ahmedabad.52

7. ASSESSMENT SCHEME :

SR. NO	NAME OF TOPIC	PERCENTAGE WEIGHTAGE
1	Introduction	05
2	Ecological aspects of environment	10
3	Natural resources	15
4	Global environmental problems	10
5	Environmental pollution	20
6	Clean Technologies	10
7	Fundamentals of seismic engineering	15
8	Natural disasters	15
	TOTAL	100