

VEER NARMAD SOUTH GUJARAT UNIVERSITY
M.Sc. – ENVIRONMENTAL CHEMISTRY
SEMESTER-1

TO COME IN FORCE FROM JUNE-2008

PAPER- (I) ENVIRONMENTAL SCIENCE AND ECOLOGY
COURSE NO. - CES- 101

Max. Marks: 70

Total

Periods: 60

SECTION -1

UNIT-I ENVIRONMENTAL SCIENCE: (10
Periods)

- Environmental Science: An Interdisciplinary Science
Fundamentals, Global Environmental Problems, Man and Environment,
Definition, principles, scope and importance
- Environmental components:
 - Atmosphere
 - Lithosphere
 - Hydrosphere
 - Biosphere

UNIT-II NATURAL RESOURCES (10
Periods)

- Natural Resources: Renewable and non renewable sources:
- Natural resources and associated problems
- Forest resources
- Water Resources
- Mineral resources
- Food Resources
- Energy Resources
- Land Resources

UNIT-III ECOSYSTEMS-I (10
Periods)

- Concepts of an ecosystem,
- Structure and function of an ecosystem.
- Producers, Consumer and decomposers,
- Energy flow in the ecosystems,
- Ecological succession.
- Food chains, Food webs and ecological pyramid

SECTION -2

UNIT-IV ECOSYSTEMS-II (10
Periods)

Introduction, Types, Characteristic features, structure and function of the following ecosystems:

- Forest ecosystem
- Grassland ecosystem
- Dessert ecosystem
- Aquatic ecosystem (Ponds, Streams, Lakes, Rivers and Oceans)

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PAPER- (II) ENVIRONMENTAL POLLUTION
COURSE NO. - CES- 102

Max. Marks: 70

Total Periods: 60

SECTION -1

UNIT-I Noise Pollution (10 Periods)

Basic Properties of sound waves-Plane and spherical waves, Sound Pressure and intensity levels, Decibel, Effects of meteorological parameters on sound propagation, Measurement and analysis of sound. A weighted sound level, Equivalent sound Pressure level (Leq), Noise pollution level, Sound exposure level, Traffic noise index, Day-Night level, Noise criteria curves, Noise resources, Machinery noise, Pumps, Compressors, Building and construction equipment, Domestic appliances, traffic-vehicular, Train, Aircraft, Prediction of traffic noise nomograph method, Noise control and abatement measures.

UNIT-II Radiation and Thermal Pollution (10 Periods)

• **Radiation Pollution**

Introduction: Definition, Sources, Nuclear concepts and terminology and ecological importance, Maximum Permissible limit, Effects of radiation- Acute, Chronic and Genetic.

• **Thermal Pollution**

Introduction-Definition, Sources of thermal pollution, Biological and other effects of thermal pollution, Thermal power plant pollution and hazardous effects, Thermal Stratification, Management of waste heat.

UNIT-III NATURAL HAZARDS: (10 Periods)

- **River flooding:** Causes, Nature and frequency of flooding, Nature and extent of flood hazard, urbanization and flooding, Environmental effects of flooding, Flood mitigation methods
- **Landslides:** Causes, human use and landslides, Prevention and correction
- **Costal Hazards:** Tropical cyclone and tsunamis, Costal erosion, Sea level changes and its impacts on costal areas.
- **Earthquakes:** Causes, Intensity and magnitude of earthquakes, Nature of destruction, Ground Subsidence, Protection from earthquake hazards.

Volcanism: Nature, extent and causes of volcanism, Volcanism and climate

SECTION -2

UNIT-IV Soil (10 Periods)

- Nature and Composition of soil
- Water and Air in Soil
- Inorganic components of soil
- Organic matter in soil
- Soil humus
- Soil solution
- Acid base and ion exchange reaction in soils
- Macro Nutrients in soil
- Micro Nutrients in soil

UNIT-V Characterization of Soil (10 Periods)

- pH
- Lime requirement of soil
- Nitrogen analysis
- Phosphorous analysis
- Exchangeable Cation Analysis
- Micro nutrient analysis
- Trace element in soil analysis
- Analysis of pesticides- Standard and polarographic analysis

UNIT-VI Soil Contaminants

(10 Periods)

- Introduction
- Sources of Soil Contaminants
- Chemical Nature of soil Contaminants
- Important environmental Properties of Soil Contaminants
- Ecological and Health effects soil Contaminants

Reference Books:

1. Chemistry of Environment, 2nd Ed., By Thomas G. Spiro and William M. Stigliani.
2. Chemistry for environmental engineering and science, 5th Ed., by sawyer, McCarty and Parkin.
3. Environmental Chemistry, 7th Ed., By S. E. Manahan.
4. Industrial Safety and Pollution control handbook. Published by National Safety Council and Associate (Data) Publishers Pvt. Ltd.
5. Fundamental concept of environmental chemistry, By G. S. Sodhi.
6. Introduction to Environmental Analysis by Roger N. Reere. John Wiley & Sons.
7. Water pollution Biology, By Richard J. Schmitz.

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PAPER- (III) Green Chemistry

COURSE NO. - CES- 103

Max. Marks: **70**

Total Periods: 60

SECTION -1

UNIT-I : BASIC PRINCIPAL OF GREEN CHEMISTRY

TWELVE PRINCIPLES:

(10 Periods)

Prevention of Waste / By – products, Maximum incorporation of the Reactants into the final products, Prevention or minimization of hazardous products, Designing safer chemicals, Energy requirements for synthesis, Selection of starting materials, Use of protecting groups, Use of catalyst, products designed should be biodegradable, Designing of manufacturing plants, Strengthening of analytical techniques.

UNIT-II :

(10 Periods)

(A) GREEN CATALYSTS

- Acid Catalysts
- Oxidation Catalysts
- Basic Catalysts
- Polymer Supported Catalyst

(B) PHASE TRANSFER CATALYSIS IN GREEN SYNTHESIS

- Introduction
- Application of PTC in organic synthesis
- Oxidation using hydrogen peroxide under PTC condition
- Crown ethers

UNIT-III : ALTERNATE RENEWABLE ENERGY SOURCES (10 Periods)

(A) MICROWAVE INDUCED GREEN SYNTHESIS

- Introduction
- Applications
- Conclusion

(B) ULTRASOUND ASSISTED GREEN SYNTHESIS

- Introduction
- Applications of Ultrasound
- Conclusion

SECTION -2

UNIT-IV : GREEN CHEMISTRY: AQUEOUS PHASE REACTIONS:

(10 Periods)

(A) GENERAL INTRODUCTION

- Wittig-Horner Reaction
- Claisen-Schmidt Condensation
- Heck Reaction
- Strecker Synthesis
- Wurtz Reaction
- Polymerization Reactions
- Photochemical Reactions
- Miscellaneous Reaction in aqueous phase

UNIT-V :GREEN CHEMISTRY: MANUFACTURE AND USES OF IMPORTANT CHEMICALS: (10 Periods)

(A) Synthesis Involving Basic principles of Green Chemistry:

- Synthesis of Styrene
- Synthesis of Adipic Acid, Catechol and 3-dehydroshikimic acid
- Synthesis of Methyl Methacrylate
- Selective alkylation of Active Methylene group
- Free Radical Bromination
- Synthesis of Ibuprofen
- Synthesis of Paracetamol

UNIT-VI : VERSATILE IONIC LIQUIDS AS GREEN SOLVENTS (10 Periods)

(A) (ALTERNATIVE SOLVENTS)

- Introduction
- Green Solvents
- Reaction in Acidic Ionic Liquids
- Reaction in Neutral Ionic Liquids
- Fluorous solvents,

(B) GREEN REAGENTS

- Dimethylcarbonate
- Polymer supported Reagents

Reference Books:

1. New Trends in Green Chemistry, 2nd edition, V.K.Ahluwalia and M. Kidwai, Anamaya Publisheres, New Delhi.
2. Green Chemistry, Theory and Practice, Paul T. Anastas and John C. Warner, Oxford University Press, 2000, New York, USA.
3. Green Chemistry : An Introductory Text, Mike Lancaster, Green Chemistry Network, University of York, RSC, 2002.
4. Handbook of Green Chemistry and Technology, edited by: James Clark and Duncan Macquarrie, Blackwell publishing.
5. Green Chemical Synthesis and Processes, Paul T. Anastas, Luren G. Heine and Tracy C. Williamsons (Editors), ACS Publication, 2000.
6. Green Chemistry and Technology, Edited by: James Clark and Duncan Macquarries, Blackwell Publishing.
7. Foye's Principals of Medicinal Chemistry, 5th edition by David A. Williams and Thomas L. Lenke.