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

**Scheme of Teaching & Examination**

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

**First Semester:**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Code</th>
<th>Board of Studies</th>
<th>Subject</th>
<th>Periods per week</th>
<th>Scheme of Exam</th>
<th>Total Credits</th>
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<td></td>
<td>L</td>
<td>T</td>
<td>P</td>
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<tr>
<td>1</td>
<td>653111(53)</td>
<td>Environmental Science &amp; Engg.</td>
<td>Principles of Environmental Engineering</td>
<td>3</td>
<td>1</td>
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<td>2</td>
<td>653112 (53)</td>
<td>Environmental Science &amp; Engg.</td>
<td>Fundamental Environmental Science</td>
<td>3</td>
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<tr>
<td>3</td>
<td>653113 (53)</td>
<td>Environmental Science &amp; Engg.</td>
<td>Environmental System Optimisation</td>
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<td>4</td>
<td>653121 (53)</td>
<td>Environmental Science &amp; Engg.</td>
<td>Fundamental Environmental Science Lab</td>
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<td>Total</td>
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<td>9</td>
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<td>4</td>
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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
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, connective diffusion; fundamentals of gaseous pollutant behaviour – 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

REFERENCE
Unit 1

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 tropic 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

REFERENCE
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 wastewat water collection systems, agriculture non point source pollution problem, air pollution control and management systems, solid waste collection etc.

TEXT

REFERENCE:
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.
5. Estimation of Heavy Metals in Given Water Samples.
6. Determination of Physical Properties of Water
   a) Density  b) pH
   c) Surface Tension  d) Turbidity  e) Conductance.

TEXT

