GONDWANA UNIVERSITY, GADCHIROLI

Choice Based Credit System (CBCS)

Syllabus of
B.Sc. I (Environmental Science)
(Semester I and II)

(Three Years Degree Course)

2017-2018
<table>
<thead>
<tr>
<th>Year</th>
<th>Semester</th>
<th>Paper</th>
<th>Paper title</th>
<th>Marks</th>
<th>Total marks</th>
<th>Credits</th>
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<tbody>
<tr>
<td>B. Sc. First Year</td>
<td>I</td>
<td>I</td>
<td>USENVT01: Fundamentals of Environmental Science</td>
<td>50</td>
<td>60</td>
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<td>II</td>
<td>II</td>
<td>USENVT02: Ecology</td>
<td>50</td>
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<td>USENVP01: Practical</td>
<td>30</td>
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<td>I</td>
<td>I</td>
<td>USENVT03: Elements of Environmental Science</td>
<td>50</td>
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<td>II</td>
<td>II</td>
<td>USENVT04: Applied Ecology</td>
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<td>USENVP02: Practical</td>
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Total marks: 150
General Instructions

- Theory examination for all Semesters will be at university level
- The examination of Semester I shall comprise of two theory papers of 3 hours duration of 50 marks each. Ten marks will be allotted for internal assessment for each theory paper.
- The examination of Semester II shall comprise of two theory papers of 3 hours duration of 50 marks each. Ten marks will be allotted for internal assessment for each theory paper.
- Question paper will consist of five questions and each question will be of 10 marks.
- Five questions will be based on four units with internal choice.
- Fifth question will be compulsory with questions from each of the four units having equal weightage and there will be no internal choice.
- Practical examination will be of 5 hours duration and separately for each semester having 30 marks each.
- Practical Examination for Odd Semester will be at college level and for Even semester at university level with external examiner.
- The syllabus is based on 6 theory periods and 6 practical periods per week.
- The marks will be given for all examinations and they will be converted into grade points. The final grade card will have marks, credits, grades, grade points, SGPA and CGPA.

<table>
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<tr>
<th>Distribution of Practical Marks (Semester I and II each)</th>
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<tbody>
<tr>
<td>1 Two experiments</td>
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<tr>
<td>2 Certified practical record book</td>
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<tr>
<td>3 Certified tour report/field diary</td>
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<td>4 Viva-voce</td>
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| Total | 30 marks |


F.Y. B.Sc. Environmental Science
Semester I
Paper I
USENVTOI: Fundamentals of Environmental Science

Total Lectures: 48
Credits: 2

Unit I: Basics of Environmental Science


Unit II: Atmospheric Science


Unit III: Hydrosphere

1. **Hydrological Cycle**: Processes involved and their complex interactions. Salient features of major water compartment: ocean, glaciers, ice and snow, groundwater, river and streams, lakes and ponds.

2. **Fresh Water Environment**: Fresh water resources of India. Fresh water requirement of India. Lentic and Lotic environment with their characteristic features. Stratification: thermal, oxygen and other nutrients.


Unit IV: Lithosphere

1. **Petrology**: Rocks in earth’s crust. Types of rocks. Igneous, Sedimentary and Metamorphic: Formation. Examples and characteristics features.


**Books for Reference:**

2. A textbook of environment –Agrawal, Mcmillion publication, Mumbai
8. Air Pollution –A .C. Stern
9. Environmental Problems and solution- Asthana, S. Chand and company, New Delhi.
Unit I: Basics of Ecology


Unit II: Organisms Ecology


Unit III: Ecosystem Ecology


2. **Ecosystem Processes**: Definition of productivity. Fundamental aspects of productivity: Primary and secondary productivity. GPP, NPP, NCP. Measurements of productivity: harvest method, oxygen method and carbon dioxide method.


Unit IV: Organism and Environment


**Books for Reference:**

1. Groundwater and surface water sampling and its storage techniques.
2. Determination of Temperature of given water sample.
4. Determination of pH of the given water sample by Electrometric method.
5. Determination of Electrical conductivity of the given water sample by conductivity meter.
6. Determination of Turbidity of the given water sample by Nephelometric method.
7. Determination of total solids, total suspended solids, total dissolved solids by gravimetric method.
8. Determination of ambient air temperature by mercury thermometer.
10. Determination of wind speed with the help of Robinson’s anemometer.
11. Determination of Solar intensity by Lux meter.
12. Determination of bulk density of the given soil sample.

Books for Reference:

F.Y. B.Sc. Environmental Science
Semester II
Paper I
USENVT03: Elements of Environmental Science

Total Lectures: 48  
Credits: 2

Unit I: Aquatic Environment


Unit II: Environmental Problems

2. **Global Climate Change:** Global climate change process. Effects of climate change on: polar ice caps, glaciers, agriculture, sea level rise, diseases, small islands, wildlife, water resources and ecosystem. Control measures.

Unit III: Environmental Priorities in India

1. **Environmental Education:** Goals. Objectives. Environmental education in India (formal and non formal). Environmental organizations and agencies (National and International).

Unit IV: Environment and Sustainable Development

3. **NGO’s in Environmental Protection**: Different NGO’s in environmental protection and their role at local, national and international level.  

(12 L)

**Books for Reference:**

2. A textbook of environment – Agrawal, Mcmillion publication, Mumbai
9. Environmental Problems and solution- Asthana, S. Chand and company, New Delhi.
Unit I: Natural Services


2. **Food Production**: General services to agriculture, crop production, livestock production, inland fisheries and aquaculture, marine fishes, terrestrial wild animal products.

3. **Atmospheric Services**: Major atmospheric services. Direct use of atmosphere for ecosystem and agriculture, combustion of fuel, air transport, communication and sound, energy and power, atmospheric recreation and climate tourism.

Unit II: Forest and Wildlife Management


Unit III: Ecological Engineering


Unit IV: Ecological Applications

1. **Introduction**: Ecological Applications: Conservation, Restoration and Sustained Biodiversity. Ecological applications at individual organism, population, communities and ecosystems, regional and global scales.


Books for Reference:


F.Y. B.Sc. Environmental Science
USENVP02: Practical

Credits: 2

1. Determination of Alkalinity of the given water sample by titration method.
2. Determination of Acidity of the given water sample by titration method.
3. Determination of Hardness of the given water sample by EDTA titration method.
4. Determination of Chlorides of the given water sample by Mohr’s method.
5. Determination of Dissolved Oxygen in the given water sample by Winkler’s method with Azide modification.
6. Determination of Free Chlorine of the given water sample by iodometric method.
7. Determination of moisture content of the given soil sample.
8. Determination of total organic carbon and percent organic matter of the given soil sample
9. Measurement of the Primary productivity of the given water body by Light and Dark bottle method.
12. Observation and study of the following relationship:
   1. Predator: Duck, Fish
   2. Parasites: Cuscuta
   3. Symbiosis: Lichens, Admesia (Sea anemone)
   4. Mutualism: Rhizobium, Termite, Honeybee
13. Identification and characterization of common Igneous, Sedimentary and Metamorphic rocks.
Books for Reference:

2. Water and Wastewater Analysis, National Environmental Engineering Research Institute (NEERI), Nagpur.
Question paper pattern

Time: 3 Hours

Max. Marks: 10

1. Long Question from unit I
   OR
   a. Short Question from unit I
   b. Short Question from unit I

2. Long Question from unit II
   OR
   a) Short Question from unit II
   b) Short Question from unit II

3. Long Question from unit III
   OR
   a) Short Question from unit III
   b) Short Question from unit III

4. Long Question from unit IV
   OR
   a) Short Question from unit IV
   b) Short Question from unit IV

5. Answer in brief:
   Solve any 10 out of 12 questions (3 questions from each unit) (1 mark each)