Gyanmanjari Innovative University

Syllabus
Gyanmanjari Institute of Technology
Semester-2

Subject: Sustainable Development: Engineering Solutions for a Greener Future-BET1XX12205

Type of course: Humanities and Social Science including Management Courses.

Prerequisite: Basic knowledge of environment and ecology.

Rationale: To inculcate the environmental values translating into pro-conservation actions. Honorable Supreme Court of India has made it 'mandatory' to introduce a basic course on environment at the undergraduate level.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks		Total Marks
CI	T	P	C	SEE	CCE	
2	0	0	2	100	50	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Unit No.	Course content	Hrs.	% Weightage
1	**Sustainability** Learning Objectives, Concept of Sustainability, Origin and History, Drivers of change, Pillars of Sustainability, Guiding principles of sustainability, Sustainable Development Goals or goals of sustainability, Criteria and indicators of sustainability, Approaches to sustainable development, Ethics, Theories of environmental ethics Globalization and sustainable development. **Examination Style:**	6	20%

Sr. No.	Evolution Methods	SEE	CCE
1.	**Short Notes (Any Two)** Students write short explanatory notes on any two topics.	10	

	highlighting key concepts, definitions, and examples where relevant.		
2.	**SDG Matching Activity** Sustainable Development Goals (Any 5 SDGs). Students match five selected SDGs.	**10**	
3.	**ALA-1: Timeline Activity** Origin & History of Sustainability. Students prepare a chronological timeline covering the following global milestones.		**10**
Total		**20**	**10**

Activity: 1. ALA-1 – Timeline Activity (10 Marks)
Origin & History of Sustainability. Students prepare a **chronological timeline** covering the following global milestones:
- Stockholm Conference (1972)
- Brundtland Report (1987)
- Rio Earth Summit (1992)
- Sustainable Development Goals (2015)

Activity: 2. SDG Matching Activity (10 Marks)
Sustainable Development Goals (Any 5 SDGs). Students match five selected SDGs.
- Their core objectives
- One real-life example or initiative from India (e.g., Swachh Bharat, Beti Bachao Beti Padhao, Jal Jeevan Mission, etc.)

Activity: 3. Short Notes (Any Two) (10 Marks)
For Example:
- Concept of Sustainability
- Pillars of Sustainability
- Environmental Ethics
- Globalization and Sustainable Development. Etc.

Students write short explanatory notes on any two topics, highlighting key concepts, definitions, and examples where relevant.

2	**Implementation, Education, and Future Perspectives** trategies for implementation: National policies (India's commitments – National Action Plan on Climate Change, Smart Cities, Swachh Bharat), Local actions, and community participation. Role of Education for Sustainable Development (ESD) in achieving SDGs (SDG 4.7). Challenges: Financing gaps, Policy conflicts, Behavioral barriers, Monitoring and evaluation.	6	20%

Case studies: Successful national and international initiatives (e.g., Costa Rica's decarburization, India's renewable energy push).

Examination Style:

Sr. No.	Evolution Methods	SEE	CCE
1.	**Case-Based Question (one case-5 questions)** Given one case study (with five sub-questions) on: For Example : India's renewable energy initiatives (solar, wind, National Solar Mission), Costa Rica's decarbonization and renewable energy model, Etc.	10	
2	**"Explain the Statement" Type** Students explain the given statement using logical reasoning, environmental concepts, and suitable real-world examples from India or global contexts.	10	
3.	**ALA-2: Community Participation Case Study** Students write a short case-study based report highlighting the role of community participation in promoting sustainability through(Suggested topics).		10
Total		20	10

Activity: 1. ALA-2 – Community Participation Case Study (10 Marks)

Topic: Local Actions for Sustainability

Students write a short case-study based report highlighting the role of community participation in promoting sustainability through(Suggested topics):

- Waste segregation practices
- Rainwater harvesting systems
- Plastic-free campus initiatives

Activity: 2. "Explain the Statement" Type Question (10 Marks)

For Example: "Community participation is essential for sustainable development, Etc.

Students explain the given statement using logical reasoning, environmental concepts, and suitable real-world examples from India or global contexts.

Activity:3. Case-Based Question (10 Marks)

<table>
<tr><td></td><td>For Example: Successful Sustainability Models, Etc.
Given one case study (with five sub-questions) on: For Example : India's renewable energy initiatives (solar, wind, National Solar Mission), Costa Rica's decarbonization and renewable energy model, Etc.</td><td></td><td></td></tr>
<tr><td>3</td><td>Human Population and Environment
Population growth, variation among nations.
Population explosion—Family Welfare Programme.
Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.
Case Studies.
Examination Style:
<table>
<tr><th>Sr. No.</th><th>Evolution Methods</th><th>SEE</th><th>CCE</th></tr>
<tr><td>1</td><td>Population Data Interpretation
Students are provided with population graphs/data comparing India and selected developed countries.</td><td>10</td><td></td></tr>
<tr><td>2.</td><td>Problem-Solving Question
faculty suggest practical and sustainable measures to improve.</td><td>10</td><td></td></tr>
<tr><td>3.</td><td>ALA-3: Awareness Poster
Suggested Poster topic: HIV/AIDS Awareness, Etc.</td><td></td><td>10</td></tr>
<tr><td colspan="2">TOTAL</td><td>20</td><td>10</td></tr>
</table>
Activity: 1. Population Data Interpretation (10 Marks)
Topic: Population Growth and Variation among Nations
Task: Students are provided with population graphs/data comparing India and selected developed countries.
They analyze the data and write interpretative conclusions focusing on growth trends, demographic differences, and possible socio-economic and environmental implications.
Activity: 2. ALA-3 – HIV/AIDS Awareness Poster (10 Marks)
Suggested Poster topic: HIV/AIDS Awareness Etc.
Students design an awareness poster highlighting:
• Causes and modes of transmission
• Prevention and control measures
• Social responsibility, stigma reduction, and ethical concerns
Activity: 3. Problem-Solving Question (10 Marks)
faculty suggest practical and sustainable measures to improve:
• Human health
• Environmental quality
• Etc.</td><td>6</td><td>20%</td></tr>
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Environmental legislation
Environment Protection Act.
Air (Prevention and Control of Pollution) Act.
Water (Prevention and Control of Pollution) Act.1974
Wildlife Protection Act.
Forest Conservation Act.
Issues involved in enforcement of environmental legislation. Public awareness.
Examination Style:
<table>
<tr><th>Sr. No.</th><th>Evolution Methods</th><th>SEE</th><th>CCE</th></tr>
<tr><td>1.</td><td>Documentary Review and Analysis
Faculty will suggest documentary and Student Will Write a 500-700-word review.</td><td>10</td><td></td></tr>
<tr><td>2.</td><td>Explain with Examples
Students explain the role of the following environmental legislations with suitable examples.</td><td>10</td><td></td></tr>
<tr><td>3.</td><td>Legislative Poster Wildlife Protection.
Students draw an informative awareness poster.</td><td></td><td>10</td></tr>
<tr><td colspan="2">Total</td><td>20</td><td>10</td></tr>
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Activity: 1. Documentary Review and Analysis (10 Marks)
Faculty will suggest documentary and Student Will Write a 500-700-word review analyzing how the issues depicted (e.g., pollution and climate impacts) relate to at least two of the discussed acts (such as the Air Act or Environment Protection Act), enforcement challenges, and the role of public awareness in addressing them. Include personal reflections on potential solutions.
Activity: 2. Wildlife Protection Poster (10 Marks)
Topic: Wildlife Protection Act
Students draw an informative awareness poster highlighting:
• Protected and endangered species
• Penalties and legal consequences for wildlife crimes
• Importance of wildlife conservation (habitat protection, biodiversity value, etc.)
Activity: 3. Legislative Poster Wildlife Protection.
(10 Marks)
Task: Students explain the role of the following environmental legislations with suitable examples:
• Environment (Protection) Act. 1986
• Air (Prevention and Control of Pollution) Act 1981
• Water (Prevention and Control of Pollution) Act 1974
</td>
<td>6</td>
<td>20%</td>
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<table>
<tr><td></td><td>• Etc.</td><td></td><td></td></tr>
<tr><td>5</td><td>Social Issues and solution
From Unsustainable to Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people: its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions.
Examination Style:
<table>
<tr><th>Sr. No.</th><th>Evolution Methods</th><th>SEE</th><th>CCE</th></tr>
<tr><td>1</td><td>Case Study with Ethical Angle
A dam project leads to the displacement of local communities.</td><td>10</td><td></td></tr>
<tr><td>2</td><td>Compare and contrast
Students compare any one pair of the following topics using suitable points or a tabular format.</td><td>10</td><td></td></tr>
<tr><td>3.</td><td>Urban Energy Problem Case Study
Students analyze a case study related to urban energy challenges, focusing on:
• Power shortages and demand supply gaps
• Dependence on fossil fuels and its impacts
• Possible renewable energy solutions (solar rooftops, wind, energy efficiency, etc.)</td><td></td><td>10</td></tr>
<tr><td colspan="2">Total marks</td><td>20</td><td>10</td></tr>
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Activity: 1. Urban Energy Problem Case Study (10 Marks)
Topic: Urban Problems Related to Energy
Task: Students analyze a case study related to urban energy challenges, focusing on:
• Power shortages and demand supply gaps
• Dependence on fossil fuels and its impacts
• Possible renewable energy solutions (solar rooftops, wind, energy efficiency, etc.)
Activity: 2. Compare and Contrast (10 Marks)
Task: Students compare any one pair of the following topics using suitable points or a tabular format:
• Unsustainable development vs Sustainable development
OR
• Conventional energy vs Renewable energy
Activity: 3. Case Study with Ethical Angle (10 Marks)
Topic: Development, Displacement, and Ethics
Task: A dam project leads to the displacement of local communities.</td><td>6</td><td>20%</td></tr>
</table>

	Students discuss: • Ethical issues involved (livelihood loss, rehabilitation, consent, equity, environmental justice) • Conflicts between development and sustainability • Practical and ethical solutions (R&R policies, stakeholder participation, alternative development models)		

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	10%	10%	30%	40%	10 %	0%

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Define sustainability as development meeting present needs without compromising future generations' abilities.
CO2	Evaluate India's NAPCC as foundational framework with eight missions focused on climate mitigation and adaptation.
CO3	Analyze global population growth as slowing, with current total around 8.2 billion and projected peak near mid-century.
CO4	Apply knowledge of these laws to real-world environmental issues, proposing strategies to address enforcement gaps and promote sustainable governance.
CO5	Examine problems and concerns in resettlement and rehabilitation of displaced people, focusing on social, economic, and equity issues.

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

1. Perspectives in Environmental studies
2. Environmental studies by Dr. D.L. Manjunath, Pearson Education-2006
3. Environmental studies by R. Rajagopalan, Oxford Publication-2005
4. Principles of Environmental Science by Curnningham. W.P. & Cunningham M.A. ,Tata McGraw Hill Publishing Co. Ltd., New Delhi.
5. Textbook of Environment & Ecology by Deeksha Dave and S.S. Katewa,Cengage Learning India Pvt. Ltd., Patparganj, Delhi, 2009

MODULE 1

Activity No. 1: SDG Matching Activity – 10 Marks

Criteria	Description	Marks
SDG Understanding & Conceptual Accuracy	Correct matching of any five SDGs with their objectives, demonstrating conceptual understanding and correct terminology.	**5 Marks**
Indian Initiatives & Application	Explanation of relevant Indian initiatives with analytical understanding and clarity.	**5 Marks**
Total		**10 Marks**

Activity No. 2: Short Notes (Any Two) – 10 Marks

Criteria	Description	Marks
Conceptual Clarity & Explanation	Clear definitions, core concepts, logical structure, and coherent explanation of the chosen topics.	**5 Marks**
Terminology, Examples & Relevance	Use of correct terminology, appropriate examples, relevance, and flow of ideas.	**5 Marks**
Total		**10 Marks**

MODULE 2

Activity No. 1: Explain the Statement – 10 Marks

Criteria	Description	Marks
Conceptual Understanding & Reasoning	Clear understanding of sustainable development with logical justification of the statement.	**5 Marks**
Examples & Critical Thinking	Use of relevant real-world examples, coherence, flow, and critical thinking.	**5 Marks**
Total		**10 Marks**

Activity No. 2: Case-Based Question – 10 Marks

Criteria	Description	Marks

Case Interpretation & Policy Analysis	Interpretation and understanding of the case with analysis of policies and sustainability practices.	**5 Marks**
Application & Clarity	Application of theoretical knowledge with accuracy, completeness, and clarity of explanation.	**5 Marks**
Total		**10 Marks**

MODULE 3

Activity No. 1: Population Data Interpretation – 10 Marks

Criteria	Description	Marks
Data Interpretation & Comparison	Correct interpretation of population data with comparison of growth trends and demographic patterns.	**5 Marks**
Implications & Presentation	Socio-economic and environmental implications with clear structure and presentation.	**5 Marks**
Total		**10 Marks**

Activity No. 3: Problem-Solving Question – 10 Marks

Criteria	Description	Marks
Problem Identification & Solutions	Identification of key health and environmental issues with practical and sustainable solutions.	**5 Marks**
Integration & Clarity	Integration of health–environment linkages with logical flow and clarity.	**5 Marks**
Total		**10 Marks**

MODULE 4

Activity No. 1: Documentary Review & Analysis – 10 Marks

Criteria	Description	Marks
Analysis of Content & Legislation	Critical analysis of documentary content, related legislation, and enforcement issues.	**5 Marks**
Awareness, Solutions & Presentation	Discussion on public awareness, solutions, structure, and presentation quality.	**5 Marks**
Total		**10 Marks**

Activity No. 2: Explain with Examples – 10 Marks

Criteria	Description	Marks
Explanation of Environmental Acts	Clear explanation of provisions of environmental Acts with conceptual understanding.	**5 Marks**
Examples & Presentation	Appropriate examples, clarity, organization, and correct terminology.	**5 Marks**
Total		**10 Marks**

MODULE 5

Activity No. 1: Compare and Contrast – 10 Marks

Criteria	Description	Marks

Comparative Understanding	Clear identification of differences and explanation of similarities.	**5 Marks**
Examples & Organization	Use of relevant examples with proper presentation and organization.	**5 Marks**
Total		**10 Marks**

Activity No. 2: Case Study with Ethical Angle – 10 Marks

Criteria	Description	Marks
Ethical Issues & Conflict Analysis	Identification of ethical issues and discussion of development vs sustainability conflict.	**5 Marks**
Solutions & Reasoning	Practical and ethical solutions with clarity and logical reasoning.	**5 Marks**
Total		**10 Marks**