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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VIII - THEORY EXAMINATION (2025 - 2026)

Subject: Sustainable Technologies

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of **three Sections -A, B, & C**. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A

20

1. Attempt all parts:-

(1.1) _____ is an example of energy efficiency. (CO1,K1)

1

- (a) Using incandescent light bulbs
- (b) Insulating buildings to reduce heating and cooling needs
- (c) Leaving appliances running when not in use
- (d) None of the above

(1.2) Identify which of the following is NOT a strategy for reducing water consumption. (CO1,K1)

1

- (a) Installing low-flow faucets and toilets
- (b) Watering lawns every day
- (c) Capturing rainwater for reuse
- (d) Implementing drip irrigation systems

(1.3) The metric measures the contribution to global warming due to emissions of greenhouse gases to the atmosphere is _____. (CO2,K1)

1

- (a) Water use
- (b) Global Warming Potential (GWP)
- (c) Embodied energy
- (d) Land use

(1.4) Identify the option that is NOT a characteristic of good indicators. (CO2,K1)

1

- (a) Relevance
- (b) Understandability
- (c) Complexity
- (d) Reliability

- (1.5) _____ is not a method of waste disposal. (CO3,K1) 1
- (a) Recycling
 - (b) Composting
 - (c) Burning
 - (d) Packaging
- (1.6) The first step in the waste management hierarchy is _____.(CO3,K1) 1
- (a) Recycling
 - (b) Landfilling
 - (c) Incineration
 - (d) Source reduction
- (1.7) Biomass energy is derived from: (CO4,K1) 1
- (a) Fossil fuels
 - (b) Plant and animal matter
 - (c) Nuclear reactions
 - (d) Geothermal heat
- (1.8) This is not a form of bioenergy. (CO4, K1) 1
- (a) Ethanol
 - (b) Biodiesel
 - (c) Natural gas
 - (d) Biogas
- (1.9) The energy resource that has the highest capacity factor is: (CO5, K1) 1
- (a) Coal
 - (b) Nuclear power
 - (c) Hydroelectric
 - (d) Wind
- (1.10) Identify the energy resources that have output dependent on weather conditions.(CO5,K1) 1
- (a) Nuclear power and coal
 - (b) Hydropower and geothermal
 - (c) Natural gas and oil
 - (d) Solar and wind

2. Attempt all parts:-

- (2.1) Explain the role of renewable energy in sustainable development.(CO1,K2) 2
- (2.2) Define sustainability index and explain its purpose.(CO2,K2) 2
- (2.3) Discuss recycling efficiency. (CO3,K2) 2
- (2.4) Wind energy can be used as renewable energy resource.Discuss. (CO4,K2) 2
- (2.5) Explain why load energy is important for sustainable energy systems. (CO5,K2) 2

SECTION-B

30

Answer any one of the following:-

- (3.1) The sustainability is related to environmental conservation. Justify this statement in 6

detail. (CO1, K3)	
(3.2) Discuss the impact of deforestation on sustainability.(CO1,K2)	6
Answer any one of the following:-	
(3.3) Discuss metrics for technology evaluation and explain why they are important in assessing technologies.(CO2,K2)	6
(3.4) Define cash flow analysis and its significance in project evaluation. (CO2,K2)	6
Answer any one of the following:-	
(3.5) Critically evaluate the challenges and opportunities in implementing integrated waste management systems at the local, regional, and global levels. (CO3,K3)	6
(3.6) Define and compare vermicomposting, and in-vessel composting.(CO3,K2)	6
Answer any one of the following:-	
(3.7) Describe the working of Solar photovoltaic systems. (CO4, K2)	6
(3.8) Distinguish between renewable and non-renewable energy sources.(CO4,K3)	6
Answer any one of the following:-	
(3.9) Discuss sustainable community and mass transit technologies and their role in promoting sustainable urban development. (CO5,K2)	6
(3.10) Explain the concept of base load energy sustainability and discuss its importance in ensuring a stable and sustainable energy supply. (CO5,K2)	6
SECTION-C	50
4. Answer any <u>one</u> of the following:-	
(4.1) A village adopts sustainable agriculture practices like crop rotation, organic farming, and water conservation. Analyze how these practices help in improving food security and protecting the environment.(CO1,K3)	10
(4.2) Discuss the potential benefits and challenges of implementing sustainable tourism practices.(CO1,K2)	10
5. Answer any <u>one</u> of the following:-	
(5.1) A construction company is choosing materials for building a house. They can use materials like steel and cement or alternatives like bamboo and recycled wood. Using the concept of embodied energy, analyze how their choice of materials will affect the environmental impact of the building.(CO2,K3)	10
(5.2) Explain the 12 Principles of Green Chemistry. Illustrate with suitable examples how these principles are applied in industrial or environmental contexts. (CO2, K2)	10
6. Answer any <u>one</u> of the following:-	
(6.1) In a neighborhood, many households throw away leftover food regularly. A local group starts an awareness program to teach people about reducing food waste. Analyze how this program can influence people's habits and suggest practical ways to encourage families to waste less food.(CO3,K3)	10
(6.2) Explain the main challenges in moving from a linear economy to a circular economy. Describe how government policies, market incentives, and cooperation between different groups can help overcome these challenges.(CO3, K2)	10
7. Answer any <u>one</u> of the following:-	
(7.1) Explain any four environmental impacts of large-scale geothermal energy	10

projects. Describe ways to reduce these impacts while still using geothermal energy effectively. (CO4, K2)

- (7.2) A town is deciding whether to generate electricity using renewable energy sources like solar and wind or continue using coal-based power. Using factors such as carbon emissions, water use, land use, and effects on ecosystems, analyze which option is more environmentally friendly and why. (CO4, K3) 10

8. Answer any one of the following:-

- (8.1) Explain the concept of zero-emission vehicles (ZEVs) and their potential to reduce carbon emissions and improve air quality. Compare and contrast different types of ZEVs, highlighting their advantages and disadvantages. (CO5, K2) 10
- (8.2) A company is planning to switch to renewable energy and use electric vehicles for transportation. Analyze how this change will affect costs, savings, and overall economic benefits for both the company and its customers. (CO5, K3) 10

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