

Printed Page:-

Subject Code:- AOE0866

Roll. No:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VIII - THEORY EXAMINATION (20 - 20)

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-a. Which of the following is NOT a pillar of sustainability? (CO1, K1) 1
- (a) Environmental
 - (b) Economic
 - (c) Social
 - (d) Technological
- 1-b. Which of the following is a characteristic of sustainable agriculture? (CO1, K1) 1
- (a) Heavy use of chemical pesticides and fertilizers
 - (b) Monoculture farming
 - (c) Crop rotation and organic farming methods
 - (d) Clearing large areas of land for farming
- 1-c. What is the primary goal of environmental metrics? (CO2, K1) 1
- (a) To assess economic impact
 - (b) To minimize environmental impacts
 - (c) To measure social acceptance
 - (d) To evaluate technological innovation
- 1-d. What does GWP stand for in environmental metrics? (CO2, K1) 1
- (a) Global Warming Potential
 - (b) Green Waste Processing
 - (c) Gross Water Pollution

- (d) General Waste Production
- 1-e. Which of the following is a non-biodegradable waste? (CO3, K1) 1
- (a) Paper
 - (b) Fruit peels
 - (c) Plastic
 - (d) Wood
- 1-f. What is the primary method for disposing of hazardous waste? (CO3, K1) 1
- (a) Incineration
 - (b) Landfilling
 - (c) Recycling
 - (d) Composting
- 1-g. Wind energy is generated using: (CO4, K1) 1
- (a) Turbines
 - (b) Generators
 - (c) Batteries
 - (d) Transformers
- 1-h. Which renewable energy technology uses mirrors to concentrate sunlight onto a receiver to produce steam? (CO4, K1) 1
- (a) Solar photovoltaic (PV)
 - (b) Solar thermal
 - (c) Wind turbines
 - (d) Tidal energy
- 1-i. What is the main advantage of base-load power plants? (CO5, K1) 1
- (a) Rapid response time
 - (b) High fuel flexibility
 - (c) Cost efficiency and reliability
 - (d) High efficiency at low capacity
- 1-j. What is the main challenge with using renewable energy sources for baseload power? (CO5, K1) 1
- (a) High cost of renewable energy technologies
 - (b) Limited availability of renewable resources
 - (c) Intermittence in time and location
 - (d) Lack of public support for renewable energy
2. Attempt all parts:-
- 2.a. What is meant by the term "sustainable development"? (CO1, K2) 2
- 2.b. State any two principles of Green Chemistry. (CO2,K2) 2
- 2.c. What is open loop recycling? (CO3, K2) 2
- 2.d. Explain two ways in which concentrating solar power (CSP) systems differ from 2

photovoltaic (PV) solar panels in generating electricity. (CO4, K2)

- 2.e. Why are coal and nuclear plants often chosen for base load power generation? (CO5, K2) 2

SECTION-B 30

3. Answer any five of the following:-

- 3-a. How does education contribute to promoting sustainability? (CO1, K3) 6
- 3-b. Explain the purpose and stages of Life Cycle Assessment (LCA). How does LCA support sustainable technology development? (CO1, K3) 6
- 3-c. What are the primary goals of environmental metrics in sustainability assessment? (CO2, K3) 6
- 3-d. What is the primary purpose of economic metrics in technology evaluation? (CO2, K3) 6
- 3.e. Evaluate the benefits and challenges of reuse and redistribution programs compared to traditional recycling and disposal methods. (CO3, K4) 6
- 3.f. What are building integrated solar energy technologies. (CO4, K3) 6
- 3.g. Evaluate the role of baseload energy in sustainable energy systems. How do different base load energy sources contribute to grid stability and reliability? (CO5, K4) 6

SECTION-C 50

4. Answer any one of the following:-

- 4-a. Define Technology Readiness Levels (TRLs). How can TRLs be used to evaluate emerging, converging technologies in sustainable development? (CO1, K4) 10
- 4-b. Explain the concept of corporate social responsibility (CSR) and its role in sustainable business practices. (CO1, K4) 10

5. Answer any one of the following:-

- 5-a. Evaluate the importance of the Global Warming Potential (GWP) metric in assessing greenhouse gas emissions and mitigating climate change. Provide examples of how GWP is used to compare emissions and inform climate policy decisions. (CO2, K4) 10
- 5-b. Explain the 12 Principles of Green Chemistry. Illustrate with suitable examples how these principles are applied in industrial or environmental contexts. (CO2, K4) 10

6. Answer any one of the following:-

- 6-a. Define electronic waste (e-waste) and discuss its composition, sources, and environmental hazards. Analyze the challenges and opportunities in managing the growing e-waste stream (CO3, K4) 10
- 6-b. Describe the impact of over consumption and waste generation on sustainability. (CO3, K3) 10

7. Answer any one of the following:-

- 7-a. Describe the concept of building-integrated photovoltaics (BIPV) and its 10

advantages in sustainable architecture. Discuss the various types of BIPV systems and their applications. (CO4, K4)

7-b. Explain the principle behind solar thermal electric power generation and compare it with photovoltaic solar power. Discuss the different types of solar thermal power plants. (CO4, K3) 10

8. Answer any one of the following:-

8-a. Discuss the environmental benefits of sustainable transportation technologies in reducing carbon emissions and promoting cleaner air quality. (CO5, K4) 10

8-b. Evaluate the environmental benefits of integrating renewable energy systems with energy storage technologies, such as batteries and pumped hydro storage. (CO5, K4) 10

REG:JAN_JUN-2025