**Printed Page:- 04** **Subject Code:- AOE0866**

**Roll. No:**

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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 (2023 - 2024)**
**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. What does the term "carbon footprint" refer to? [CO1] 1

(a) The amount of carbon dioxide released into the atmosphere
(b) The size of a person's shoe
(c) The impact of a person's actions on the environment
(d) The total energy consumption of a country

1-b. Which of the following is a renewable source of energy? [CO1] 1

(a) Oil
(b) Coal
(c) Solar power
(d) Natural gas

1-c. According to Werner and Souder, what is the key factor in choosing an appropriate measurement metric? [CO2] 1

(a) Availability of data
(b) User's needs and purpose
(c) Area of study
(d) Data accessibility

1-d. Leading metrics primarily indicate: [CO2] 1

(a) Current status
(b) Future possibilities

(c) Past events
(d) Real-time data

1-e. Which of the following is not a method of waste disposal? [CO3] 1

(a) Recycling
(b) Composting
(c) Burning
(d) Packaging

1-f. Which of the following is not a common method for recycling e-waste? [CO3] 1

(a) Refurbishing
(b) Shredding
(c) Dumping
(d) Melting

1-g. Biomass energy is derived from: [CO4] 1

(a) Fossil fuels
(b) Plant and animal matter
(c) Nuclear reactions
(d) Geothermal heat

1-h. Geothermal energy harnesses: [CO4] 1

(a) Earth's magnetic field
(b) Heat from the sun
(c) Heat from the Earth's interior
(d) Ocean currents

1-i. What are base load power sources primarily responsible for? [CO5] 1

(a) Meeting peak power demands
(b) Operating continuously to meet minimum power demand
(c) Providing emergency power supply
(d) Responding rapidly to changes in demand

1-j. Which energy resource has the highest capacity factor? [CO5] 1

(a) Coal
(b) Nuclear power
(c) Hydroelectric
(d) Wind

2. Attempt all parts:-

2.a. What role does renewable energy play in sustainable development? 2

2.b. Write different components of PV panel? 2

2.c. What is the purpose of waste management? 2

2.d. Write few advantages of geothermal energy systems. 2

| | | |
|---|---|---|
| 2.e. | What are some advantages of base load power plants? | 2 |

**SECTION-B** 30

3. Answer any five of the following:-

| | | |
|---|---|---|
| 3-a. | Describe the concept of the "triple bottom line" in sustainability. [CO1] | 6 |
| 3-b. | Discuss the challenges associated with achieving sustainable consumption patterns. [CO1] | 6 |
| 3-c. | Explain the concept of Global Warming Potential (GWP) and its application in assessing greenhouse gas emissions. [CO2] | 6 |
| 3-d. | Differentiate between input metrics and output metrics in environmental assessment. [CO2] | 6 |
| 3.e. | Define recycling efficiency and explain how it is calculated in waste management systems. Discuss the factors influencing recycling efficiency, including collection methods, sorting technologies, material composition, market demand, and policy incentives. [CO3] | 6 |
| 3.f. | Describe the working of Solar photovoltaic systems. [CO4] | 6 |
| 3.g. | Discuss the concept of a smart grid and its potential to optimize energy use, improve grid reliability, and promote sustainability. Provide examples of smart grid technologies and their applications. [CO5] | 6 |

**SECTION-C** 50

4. Answer any one of the following:-

| | | |
|---|---|---|
| 4-a. | Discuss the concept of intergenerational equity in the context of sustainability. [CO1] | 10 |
| 4-b. | Describe the impact of over consumption and waste generation on sustainability. [CO1] | 10 |

5. Answer any one of the following:-

| | | |
|---|---|---|
| 5-a. | Discuss the importance of environmental metrics related to lifecycle inputs and outputs in sustainability assessments. Provide examples of such metrics and explain their role in decision-making processes. [CO2] | 10 |
| 5-b. | Explain the concept of Global Warming Potential (GWP) and its application in assessing greenhouse gas emissions. [CO2] | 10 |

6. Answer any one of the following:-

| | | |
|---|---|---|
| 6-a. | Discuss the concept of "waste hierarchy" and its significance in waste management planning. Evaluate the effectiveness of waste management strategies such as waste prevention, reduction, reuse, recycling, energy recovery, and disposal in achieving sustainable waste management goals. [CO3] | 10 |
| 6-b. | Define open-loop and closed-loop recycling systems and compare their key characteristics, benefits, and limitations. Discuss the principles of circular economy and how they relate to open-loop and closed-loop recycling approaches. [CO3] | 10 |

7. Answer any one of the following:-

| | | |
|---|---|---|
| 7-a. | Define renewable energy and provide examples of commonly used renewable energy sources. Discuss the advantages and limitations of renewable energy compared to conventional fossil fuels. Explain the concept of net energy gain in renewable energy systems and its significance. [CO4] | 10 |
| 7-b. | Compare and contrast building-integrated photovoltaics (BIPV) with traditional solar panel installations. Evaluate the advantages and disadvantages of integrating solar energy technologies into building design and construction. [CO4] | 10 |

8. Answer any <u>one</u> of the following:-

| | | |
|---|---|---|
| 8-a. | Discuss sustainable community and mass transit technologies and their role in promoting sustainable urban development. Provide examples of innovative transit solutions that prioritize environmental sustainability and community well-being. [CO5] | 10 |
| 8-b. | Compare and contrast different types of renewable energy storage technologies and their effectiveness in addressing intermittency issues in renewable energy systems. [CO5] | 10 |