Printed Page:-04 **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 (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. Which of the following is NOT a pillar of sustainability? [**CO1]** 1

(a) Environmental

(b) Economic

(c) Social

(d) Technological

1-b. Which of the following is an example of a renewable resource? [**CO1]** 1

(a) Fossil fuels

(b) Coal

(c) Wind energy

(d) Natural gas

1-c. Which of the following is NOT a component of a metric system? [**CO2]** 1

(a) The item being measured

(b) The method of measurement

(c) The inherent value associated with the metric

(d) The standardization level ormers

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

(a) Current status

(b) Future possibilities

(c) Past events

(d) Real-time data

1-e. What is the main objective of waste management? [**CO3]** 1

(a) Minimize waste generation

(b) Maximize waste disposal

(c) Reduce waste reuse

(d) Increase waste pollution

1-f. What is the primary reason for recycling e-waste? [**CO3]** 1

(a) To conserve landfill space

(b) To reduce energy consumption

(c) To prevent pollution from hazardous materials

(d) To generate revenue for the government

1-g. Wind energy is generated using: **[CO4]** 1

(a) Turbines

(b) Generators

(c) Batteries

(d) Transformers

1-h. Which renewable energy source produces electricity by harnessing the kinetic energy of ocean waves? **[CO4]** 1

(a) Tidal energy

(b) Wave energy

(c) Ocean thermal energy

(d) Hydroelectric energy

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

(a) Coal

(b) Nuclear power

(c) Hydroelectric

(d) Wind

1-j. Which energy technology is considered suitable for peak power generation? 1

[CO5]

(a) Nuclear power

(b) Hydropower

(c) Natural gas

(d) Wind

2. Attempt all parts:-

2.a.	What do you understand by "triple bottom line" in sustainability. **[CO1]**	2
2.b.	Write few advantages of geothermal energy systems. **[CO2]**	2
2.c.	What is waste management? **[CO3]**	2
2.d.	What is renewable energy? Give some examples of renewable energy resources? **[CO4]**	2
2.e.	What are base load power sources, and what is their role? **[CO5]**	2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a.	How does sustainability relate to environmental conservation? Explain. **[CO1]**	6
3-b.	What role does economics play in sustainable development? **[CO1]**	6
3-c.	What are the primary goals of environmental metrics in sustainability assessment? **[CO2]**	6
3-d.	Write down the significance of understanding embodied energy values of materials in sustainable design? **[CO2]**	6
3.e.	Evaluate the advantages and limitations of open-loop and closed-loop recycling systems in terms of material quality, market demand, recycling rates, and end-of-life management. Discuss strategies for optimizing recycling processes and transitioning towards more closed-loop systems. **[CO3]**	6
3.f.	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, such as parabolic trough, solar power tower, and parabolic dish systems. **[CO4]**	6
3.g.	Explain the concept of base load energy and its significance in maintaining grid stability and reliability. Discuss the role of different base load energy sources in sustainable energy systems. **[CO5]**	6

SECTION C **50**

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

4-a.	Explain the concept of sustainability. Describe the pillars of sustainability and	10

provide examples of each. **[CO1]**

4-b. what do you understand by non-renewable resources . Also write down the difference between renewable and non-renewable resources and their significance for sustainability. **[CO1]** 10

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

5-a. Explain the concept of embodied energy and its significance in assessing environmental impact. Provide examples of materials with high and low embodied energy and their implications. **[CO2]** 10

5-b. Evaluate the significance of environmental metrics, economic metrics, and social metrics in technology evaluation, discussing their interdependence and role in promoting sustainability. **[CO2]** 10

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

6-a. Analyze the role of international treaties, Discuss the challenges and opportunities in establishing global e-waste governance frameworks and fostering international cooperation to address the growing e-waste crisis. **[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 <u>one</u> of the following:-

7-a. 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]** 10

7-b. Explain the key factors influencing the feasibility and scalability of renewable energy projects. Discuss the economic, social, and technological barriers to the widespread adoption of renewable energy solutions. **[CO4]** 10

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

8-a. Evaluate the role of base load energy in sustainable energy systems. How do different base load energy sources contribute to grid stability and reliability? **[CO5]** 10

8-b. Can renewable energy sources alone meet global energy demand? Evaluate the potential of renewables in addressing energy needs while considering challenges such as intermittency, grid integration, and energy storage. **[CO5]** 10