	INDIAN SCHOOL AL WADI AL KABIR	
Class: X	**Department: SCIENCE 2026 – 27** **SUBJECT: DESIGN THINKING & INNOVATION**	**Date of submission:** **30.10.2026**
Worksheet No: PART B – 6 **with answers**	**UNIT 6: PART B – FUNDAMENTALS TO SUSTAINABILITY AND DESIGN**	**Note:** **A4 FILE FORMAT**
NAME OF THE STUDENT	**CLASS & SEC: X A TO I**	**ROLL NO.**

MULTIPLE CHOICE QUESTIONS

1. Which of the following best defines sustainability in design?
a) Designing products that are cheap and attractive
b) Designing products that last forever without repair
c) Designing solutions that meet present needs without compromising future generations
d) Designing products only for short-term use

Answer: c) Designing solutions that meet present needs without compromising future generations

2. Which of the following is an example of a **sustainable practice** in design?
a) Using single-use plastic packaging
b) Designing for product recycling and reuse
c) Increasing product waste for higher sales
d) Using non-renewable energy sources

Answer: b) Designing for product recycling and reuse

3. The **triple bottom line** of sustainability includes:
a) People, Profit, Process
b) People, Planet, Profit

c) Price, Product, Promotion
d) Purpose, Performance, Power

Answer: b) People, Planet, Profit

4. Which of the following is **NOT** a principle of sustainable design?
a) Reduce resource consumption
b) Use renewable materials
c) Encourage product obsolescence
d) Design for recycling

Answer: c) Encourage product obsolescence

5. Which United Nations initiative provides global goals for sustainability?
a) COP 27 Agreement
b) Sustainable Development Goals (SDGs)
c) Paris Industrial Act
d) Global Recycling Program

Answer: b) Sustainable Development Goals (SDGs)

6. The concept of **circular economy** in design focuses on:
a) Designing for planned obsolescence
b) Reducing material costs by avoiding recycling
c) Keeping materials in use through recycling, reuse, and repair
d) Increasing production efficiency only

Answer: c) Keeping materials in use through recycling, reuse, and repair

7. Which is an **example of eco-friendly design material**?
a) Bamboo instead of plastic
b) Coal-based paints
c) Styrofoam packaging
d) Non-biodegradable thermoplastics

Answer: a) Bamboo instead of plastic

8. Which of these best represents the **"reduce"** principle in sustainability?
a) Buying new clothes frequently
b) Turning off lights when not in use
c) Using plastic bottles instead of steel bottles
d) Burning waste materials

Answer: b) Turning off lights when not in use

9. In product design, **life cycle assessment (LCA)** is used to:
a) Evaluate product color and style
b) Assess environmental impact at every stage of the product's life
c) Increase product sales in the market
d) Determine only the raw material cost

Answer: b) Assess environmental impact at every stage of the product's life

10. Which of these is a **benefit of sustainable design**?
a) Shorter product lifespan
b) Increased pollution
c) Resource conservation and long-term cost savings
d) High dependency on fossil fuels

Answer: c) Resource conservation and long-term cost savings

DESCRIPTIVE TYPE QUESTIONS

1.What is sustainability in design? Explain its importance with an example.

Answer:
Sustainability in design means creating products, services, or systems that meet present needs without harming the environment or compromising the ability of future generations to meet their needs. It focuses on minimizing waste, using renewable resources, and reducing negative impacts on people and the planet.
Example: Designing packaging from biodegradable materials instead of single-use plastics helps reduce pollution and conserves resources.

2.Explain the **three pillars (triple bottom line)** of sustainability with reference to design.

Answer:
The three pillars are:

- **People (Social):** Designs should improve human well-being, ensure fairness, and promote safe working conditions.
- **Planet (Environmental):** Designs should minimize environmental impact by reducing waste, pollution, and resource use.
- **Profit (Economic):** Designs should be financially viable, cost-effective, and promote long-term growth without exploiting resources.
  Together, these three ensure balanced, sustainable development.

3.What is the difference between **linear economy** and **circular economy** in product design?

Answer:

- **Linear Economy:** Follows the "take–make–dispose" model. Resources are extracted, products are made, used, and then discarded as waste. This leads to resource depletion and pollution.
- **Circular Economy:** Follows the "reduce–reuse–recycle" model. Products are designed to be reused, repaired, or recycled, keeping resources in use for as long as possible and reducing waste.
  Example: Old clothes in a linear economy are thrown away, but in a circular economy, they can be recycled into new fabric or upcycled into bags.

4.What is a **Life Cycle Assessment (LCA)** in sustainable design? Why is it important?

Answer:
Life Cycle Assessment (LCA) is a process to evaluate the environmental impacts of a product throughout its life cycle – from raw material extraction to production, use, and disposal.

- **Importance:**
  - Helps identify stages where pollution and waste are highest.
  - Encourages the use of eco-friendly materials and processes.
  - Supports companies in making responsible and efficient design choices.
    Example: LCA of a plastic bottle shows high environmental cost in production and disposal, encouraging the use of glass or reusable bottles.

5.Discuss **three principles of sustainable design** with examples.

Answer:

1. **Reduce:** Minimize resource and energy consumption.
   Example: Using energy-efficient LED lighting instead of incandescent bulbs.
2. **Reuse:** Extend the life of products by repurposing or repairing.
   Example: Using glass jars as storage containers instead of discarding them.
3. **Recycle:** Convert waste into usable raw material.
   Example: Recycling paper to produce new paper products.

6.How can sustainable design contribute to solving global environmental problems?

Answer:
Sustainable design helps reduce climate change, pollution, and resource scarcity by:

- Using renewable energy instead of fossil fuels (reduces carbon footprint).
- Designing biodegradable packaging to cut down plastic waste in oceans.
- Encouraging recycling and circular economy to conserve resources.
- Creating long-lasting, repairable products to reduce electronic waste (e-waste).
  Thus, sustainable design ensures both environmental protection and economic stability.

Prepared by: **Ms. Aiswarya Deepthi.P**	**Checked by:** **AVP – Science and French**