MCN-201:
SUSTAINABLE ENGINEERING

Module 5

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Module 5

Sustainability practices:

- Basic concept of sustainable habitat
- Methods for increasing energy efficiency in buildings
- Green Engineering
- Sustainable Urbanisation
- Sustainable cities
- Sustainable transport.

3. Green Engineering

- Green engineering approaches the design of products and processes by applying financially and technologically feasible principles to achieve one or more of the following goals:

1. **decrease in the amount of pollutio**n that is generated by a construction or operation of a facility
2. **minimization of human population exposure** to potential hazards (including reducing toxicity)
3. **improved uses of matter and energy** throughout the life cycle of the product and processes.
4. **maintaining economic efficiency and viability**.

Green engineering can an guiding principle framework for all design disciplines.

12 principles of Green Engineering

1. **Inherent Rather Than Circumstantial**
   Designers need to strive to ensure that all materials and energy inputs and outputs are as inherently non hazardous as possible.
2. **Prevention Instead of Treatment**
   It is better to prevent waste than to treat or clean up waste after it is formed.
3. **Design for Separation**
   Separation and purification operations should be designed to minimize energy consumption and materials use.

12 principles of Green Engineering - CONTINUED

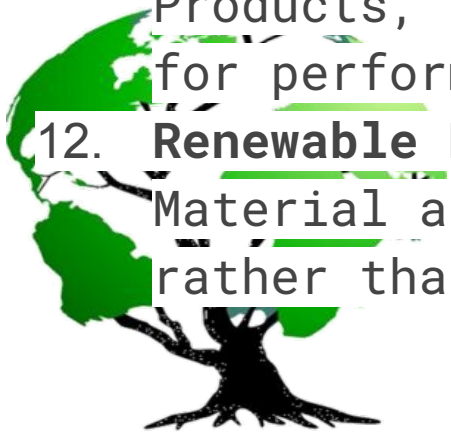
4. **Maximize Efficiency**
   Products, processes, and systems should be designed to maximize mass, energy, space, and time efficiency.
5. **Output-Pulled Versus Input-Pushed**
   Products, processes, and systems should be “output-pulled” rather than “input-pushed” through the use of energy and materials.

12 principles of Green Engineering - CONTINUED

6. **Conserve Complexity**
   Embedded entropy and complexity must be viewed as an investment when making design choices on recycle, reuse, or beneficial disposition.
7. **Durability Rather Than Immortality**
   Targeted durability, not immortality, should be a design goal.
8. **Meet Need, Minimize Excess**
   Design for unnecessary capacity or capability (e.g., “one size fits all”) solutions should be considered a design flaw.
9. **Minimize Material Diversity**
   Material diversity in multicomponent products should be minimized to promote disassembly and value retention.

12 principles of Green Engineering - CONTINUED

10. **Integrate Material and Energy Flows**
    Design of products, processes, and systems must include integration and interconnectivity with available energy and materials flows.
11. **Design for Commercial “Afterlife”**
    Products, processes, and systems should be designed for performance in a commercial “afterlife.”
12. **Renewable Rather Than Depleting**
    Material and energy inputs should be renewable rather than depleting



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