MCN-201:
SUSTAINABLE ENGINEERING

Module 3

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Module 3

Environmental management standards: ISO 14001:2015 frame work and benefits

Scope and goal of Life Cycle Analysis(LCA),

Circular economy,

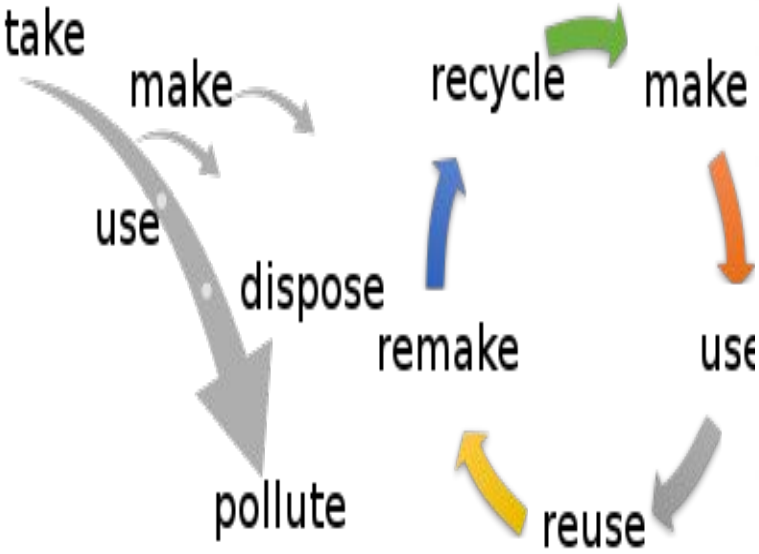
Bio-mimicking,

Environment Impact Assessment (EIA),

Industrial ecology and industrial symbiosis.

3. Circular economy

- ★ A circular economy (CE) comprises sharing, leasing, reusing, repairing, refurbishing, and recycling materials and products as long as possible.
- ★ CE emphasizes design-based implementation of the model's three main principles to address climate change, biodiversity loss, waste, and pollution.
- ★ The circular economy requires eliminating waste and pollution, rotating products and materials, and regenerating nature. CE differs from linear economy.
- ★ CE is popular because it reduces emissions and raw material consumption, opens new markets, and improves consumption sustainability and resource efficiency.



Benefits?

★ Waste prevention, ecodesign, and re-use might save the companies money and lower greenhouse gas emissions.

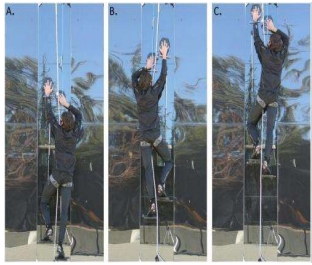
★ circular economy might reduce environmental impact, improve raw material security, promote competitiveness, innovation, economic growth, and job creation.

4. Bio-mimicking

- ★ Biomimicry, which literally means "imitation of life," aims to take inspiration from natural selection solutions adopted by nature and translate the principles to human engineering
- ★ The goal of the biomimicry approach is to favor "choices" that nature has already tried and tested over millions of years.
- ★ Biometrics-based designs will allow humans to make things that are more efficient, durable, and long-lasting.

Examples of Biomimicry

1. Climbing pads capable of supporting human weight are a mimic of the biomechanics of gecko feet.



2. The aerodynamics of the famous Japanese Bullet train was inspired by the shape of a bird's beak.

3. The first flying machine heavier than the air from
the Wright brothers, in 1903, was inspired by flying pigeons.

Examples of Biomimicry

4. Architecture is inspired by termite mounds to design passive cooling Structures.

5. Velcro is born from the observation of the hooks implemented by some plants for the propagation of their seeds via animal's coat.

6. The study of shark skin is at the origin of particularly effective swimming suits.