



Green Engineering and Sustainable Urbanization

Module 6

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Green Engineering

- ▶ It is the design, commercialization and use of materials, products, devices processes and systems, **that are feasible and economical with the objective of minimizing overall environmental impact** throughout the entire life cycle of a product or process, from initial extraction of raw materials to ultimate disposal of materials.



Four approaches are

- 1. waste reduction
- 2. materials management
- 3. pollution prevention
- 4. Product enhancement



Principles of Green engineering

- Use of non hazardous resources
- Prevention of waste
- Easy separation
- Durability of products
- Design for need
- Maximum efficiency
- Renewable rather than depleting
- Holistic approach
- Think beyond

Sustainable Urbanization



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Problems of urbanization

- 1. overpopulation
- 2. Adequate housing
- 3. Supply of food and other commodities
- 4. Water availability and decreasing quality
- 5. Energy demand
- 6. Pollution
- 7. Solid waste
- 8. Sanitation and drainage facility
- 9. Altered land use



Industrial Processes

- ▶ They are procedures to aid in the manufacturing of an item or items, usually carried out on a very large scale involving chemical, physical, electrical or mechanical steps.



Material Selection

- Identification of the design requirements
- Identification of the criteria for material selection
- Evaluation of candidate materials
- Selection of materials



Identification of design requirements

- ▶ Performance requirements
- ▶ Reliability requirements
- ▶ Size, shape and density requirements
- ▶ Cost
- ▶ Manufacturing
- ▶ Government regulations
- ▶ Sustainability requirements



Pollution Prevention (P2)

- Reduction or prevention of pollution at source is fundamentally different and more desirable than recycling, treatment and disposal.
- Reduction or prevention of pollution at source can be done through cost effective changes in production, operation