

The background features abstract, colorful swirls in shades of green, purple, and blue, interspersed with small yellow triangles, creating a dynamic and celebratory feel.

Introduction to Sustainable Engineering

BE 103

Module II

➤ Air Pollution

❖ Effects of Air Pollution

➤ Water pollution

❖ Sources

❖ Sustainable wastewater treatment

➤ Solid waste

❖ Sources

❖ Impacts of solid waste

❖ Zero waste concept

❖ 3 R concept

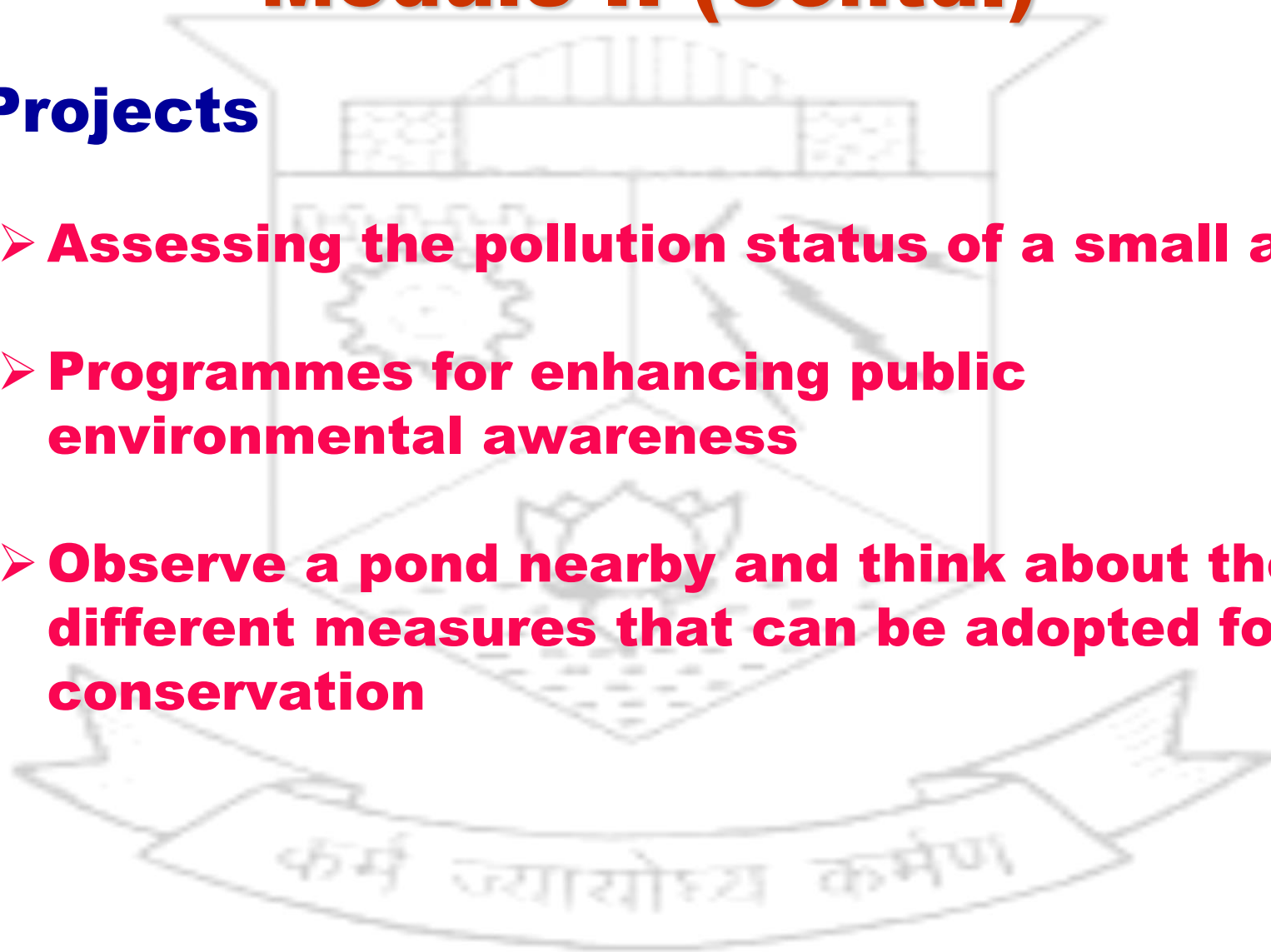
Module II (Contd.)

- 
- **Global environmental issues**
 - ❖ **Resource degradation**
 - ❖ **Climate change**
 - ❖ **Global warming**
 - ❖ **Ozone layer depletion**
 - **Regional and Local Environmental Issues**
 - **Carbon credits and carbon trading**
 - **Carbon foot print**

Module II (Contd.)

• Projects

- **Assessing the pollution status of a small area**
- **Programmes for enhancing public environmental awareness**
- **Observe a pond nearby and think about the different measures that can be adopted for its conservation**





Land pollution

Solid waste

- **Definition**

- **Substances or objects which are disposed off or are intended to be disposed off as by the provisions of the law**



Sources of solid waste



Impacts of solid waste



Impact of solid waste on land

- **Deteriorates soil quality, affects vegetation**
 - **Toxic chemicals enter our food chain through plants**
- **Breeding ground for disease vectors – rats, flies, pathogens**
- **Land value (market price) low**
- **Attract birds – affect air traffic**



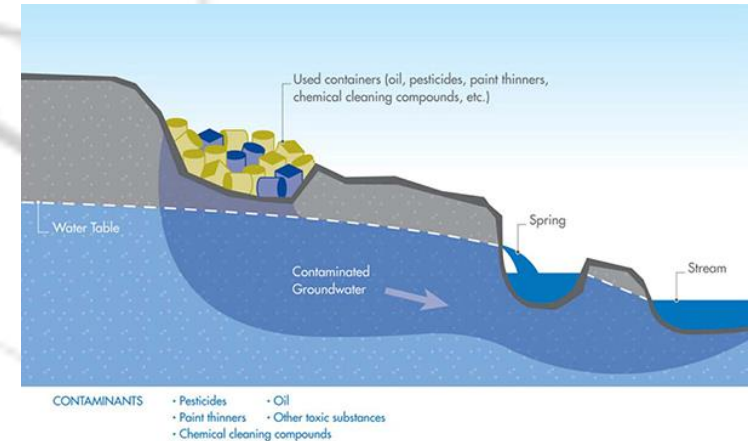
← During take-off

During landing →



Impact of solid waste on water

- **Deteriorates water quality, affects vegetation**
 - ❖ **Toxic chemicals enter our food chain through plants**
- **Leachate can enter ground water bodies**
- **High nutrient content can deplete dissolved oxygen causing eutrophication**
- **Leachate can penetrate into municipal potable water supply system**



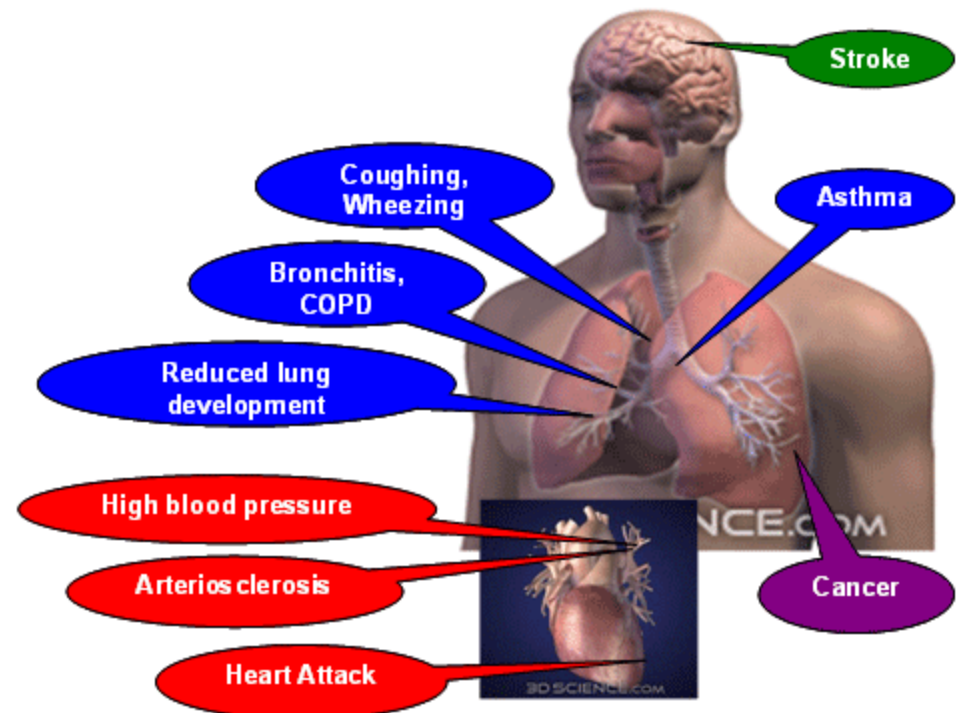
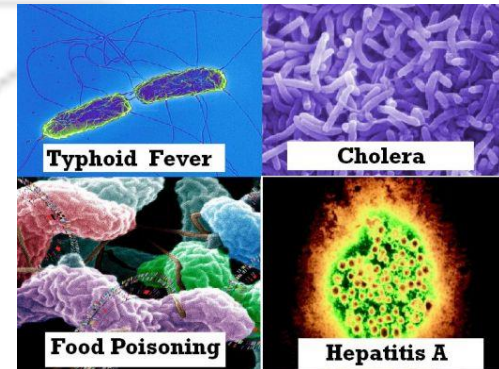
Impact of solid waste on air

- **Wet waste decomposes and release bad odour**
- **Emission of GHGs into atmosphere during decomposition**
- **Burning of solid waste retards air quality**
- **Microorganisms spread into the air and become disease vectors**



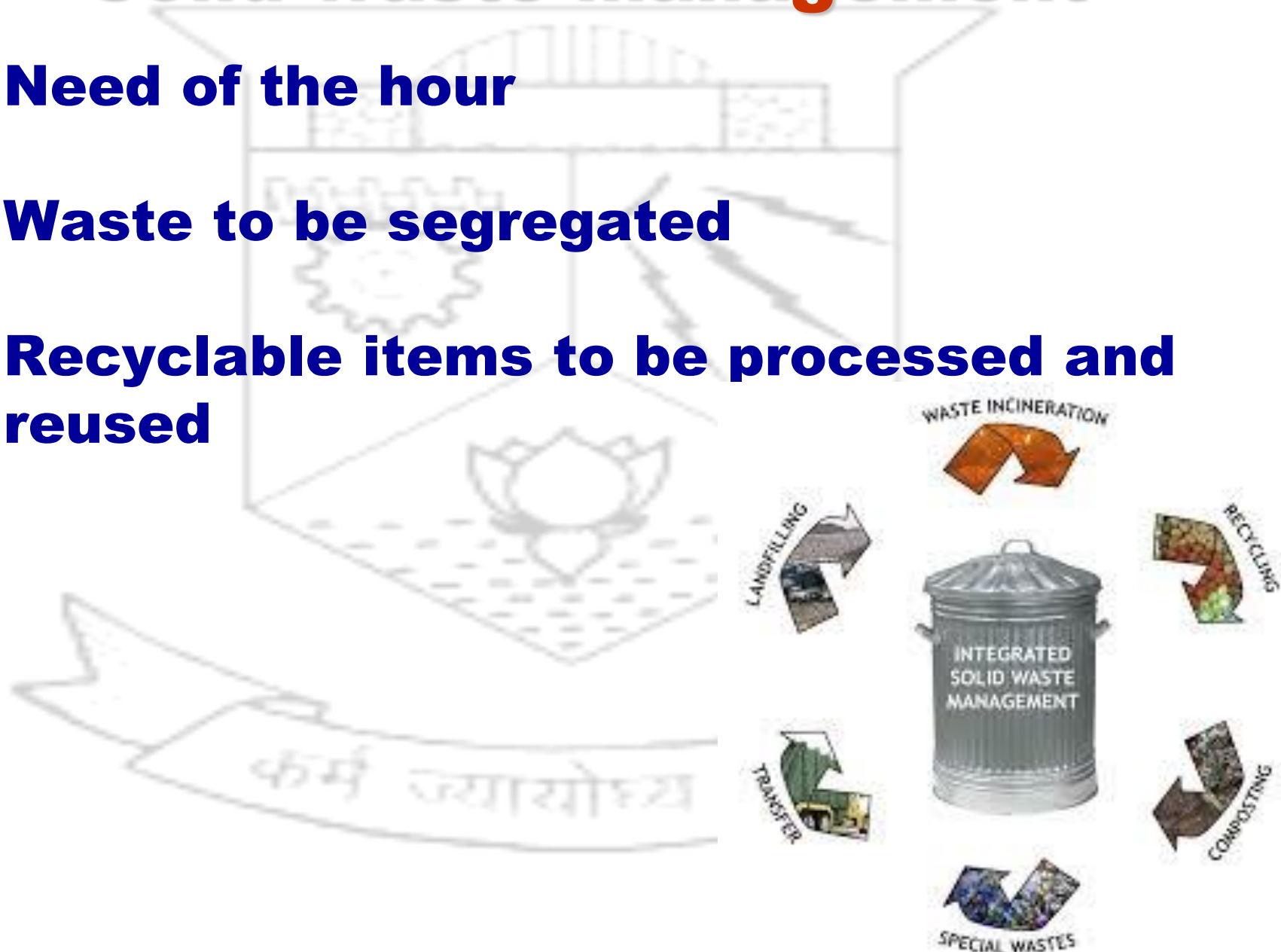
Impact of solid waste on Health

- Spread of water borne diseases
- Spread of air borne diseases
- Skin diseases due to heavy metals



Solid waste management

- **Need of the hour**
- **Waste to be segregated**
- **Recyclable items to be processed and reused**



Zero waste concept

- **Philosophy that encourages the redesign of resource life cycles so that all products are reused**
- **100% reuse and recycling**
- **No trash is sent to landfills and incinerators**



Figure 1 Zero Waste components
Own image based on "Zero Waste" by Robin Murray

Zero waste concept (Contd.)



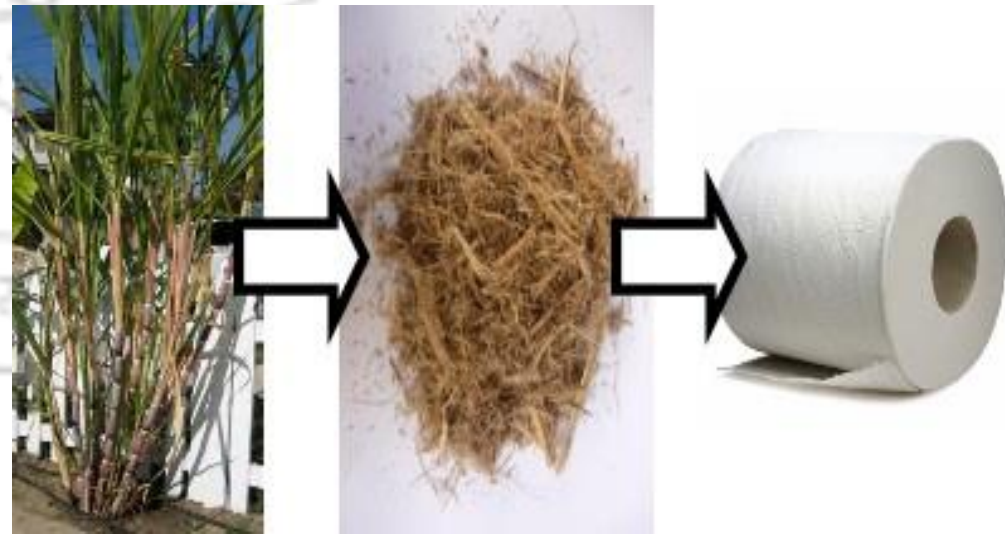
Zero waste concept (Contd.)

➤ **Waste from one industry can be a valuable resource to another industry**

❖ **Cloth rags from textile industry used by paper industry**

❖ **Bagasse, a waste product from sugar industry used by paper industry**

❖ **Waste from oil industry used as cattle feeds**



3R concept



3R concept (Contd.)

- **Reduce waste**

- **Do not use what you do not need**

- **Goal – low waste or no waste**

- **Examples**

- ❖ **Carry shopping bag to market**

- ❖ **Take rough print on one side sheets**

- ❖ **Railway ticket – no print required**

- ❖ **Going into a paperless world**

3R concept (Contd.)

- **Reuse waste**

- **Try to reuse the discarded waste**

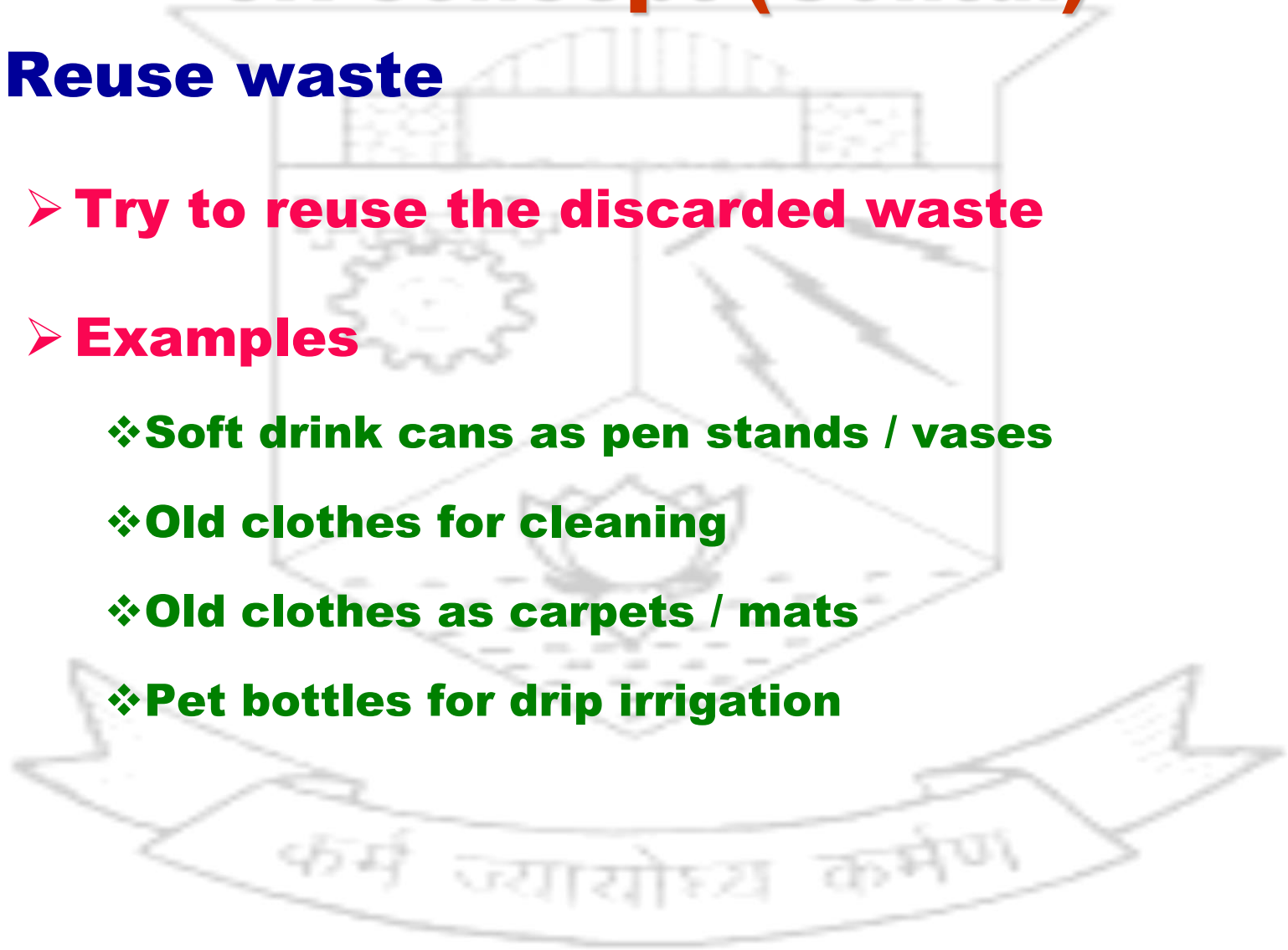
- **Examples**

- ❖ **Soft drink cans as pen stands / vases**

- ❖ **Old clothes for cleaning**

- ❖ **Old clothes as carpets / mats**

- ❖ **Pet bottles for drip irrigation**



3R concept (Contd.)

➤ **Recycle waste**

- ❖ **The discarded waste that cannot be reused to be recycled**
- ❖ **Waste to be sorted first at the source itself**
- ❖ **Recyclables collected**
- ❖ **Used as raw**
- ❖ **Examples**
 - o **Kitchen waste as biofuel / fertiliser**
 - o **Plastic waste for road construction**
 - o **Plastic waste for new plastic products**
 - o **Metal waste for new metal products**
 - o **Cardboards from waste newspaper / books**
 - o **Shredded tyres in pavement construction / soil stabilisation**