

Science and Technology Class 08

5th August, 2023 at 1:00 PM

NANOTECHNOLOGY IN INDIA: (1:10:49 PM):

- In 2007, National Mission on Nano Science and Technology was announced under DST.
- It focussed on developing infrastructure for basic research promotion in nanotechnology, applications of nanotechnology, public-private partnerships, human resource development, and international collaborations.
- Ministry of Electronics and IT has a nano-tech division with a focus on post-Moore electronics, Computational nanoelectronics, and sensors, among others.
- **Nano fertilizer:**
- **Recently GOI has introduced 2 nano fertilizers:**
- Nano-DAP made by IFFCO.
- 1 Nano Urea bottle is sold in 500 ml capacity.
- This bottle can replace a typical Urea bag of 45 kg which has about 20 Kg of Nitrogen.
- Such nano fertilizers have many benefits:
- They are produced in an energy-efficient environment with less carbon footprint.
- The use of Urea occurs in a more efficient manner which maintains the fertility of the soil and also doesn't contribute to water pollution.
- It is not subsidized by the government and still cost of one bottle is equivalent to one bag of normal urea.
- The logistics cost of Nano Urea is much less than normal Urea.
- **Concerns:**
- Many experts have doubts regarding the efficacy of nano fertilizers.
- Government has a protocol to conduct trials independently for 3 years before introducing a new fertilizer.
- In the case of Nano Urea, the trials were conducted for 2 years.
- Nano Urea can be used only when the crop has grown and leaves are visible.
- It can be spread on crops and the stomata of leaves can absorb nano nitrogen.
- Its use on soil leads to wastage.
- Some people have argued that GOI has rushed into introducing this fertilizer without working on awareness among farmers.
- **Concerns with Nanotechnology:**
- Like any other emerging technology nanotechnology presents both opportunities and challenges.
- **-Health and safety:**
- The potential toxicity of nanoparticles raises health and safety concerns.
- **-Environmental concerns:**
- The long-term effects of synthetic nanomaterials on ecosystems and biodiversity are still being investigated.
- **-Regulatory Challenges:**
- It is a rapidly evolving field and regulatory frameworks and policies are still being developed for appropriate regulations for nanomaterials.
- It is a highly interdisciplinary field that requires expertise in multiple areas.
- Thus the availability of a skilled workforce is a challenge.

CARBON NANOTUBES: (2:04:37 PM):

- They are rolled-up sheets of single-layer carbon atom graphene.
- This tube has excellent thermal and electrical properties, high strength, high aspect ratio.
- They can be single-walled or multi-walled.
- Ideal for a wide range of applications:
- In electronics- Used in transistors, sensors, and interconnected devices.
- In Energy storage devices like batteries, and fuel cells.
- They are used for targeted drug delivery.
- Also used for making sports equipment like tennis racquets, bats, etc.
- **Quantum dots:**
- Nano-scale semiconductors.
- They have amazing optical and electrical properties.
- Eg-- Even in the presence of 1 monochromatic light, they can emit light of various colors just by changing the size.
- Applications in display technology-QLED, solar cells, medical imaging, Quantum computing, etc.

INFORMATION AND COMMUNICATION TECHNOLOGY: (ICT): (2:50:33 PM):

- Modern Communication technology is possible because of the understanding of electromagnetic waves.
- Electromagnetic waves are vibrations of electric and magnetic fields.
- **Depending upon its frequency and wavelength it can be divided into:**
- Gamma rays.
- X-rays.
- Ultraviolet light.
- Visible light.
- Infrared rays.
- Microwave.
- Radio waves-- frequency is 300 KHz to 300 GHz.
- For modern communication, radio waves are used.
- They are generated artificially and received by receivers using antennas.
- To prevent interference between different users, the generation and transmission of radio waves is strictly regulated by national laws and coordinated by an international body ITC-- UN agency.

The topic for the next class- Communication technologies.