Empathy questions

1. How might the use of nanotechnology in medicine affect patient trust and the doctor-patient relationship?
2. What concerns do people have about the long-term effects of nanomaterials on their health and the environment?
3. How can we ensure that nanotechnology-based treatments are accessible and safe for all socioeconomic groups?
4. What are the potential environmental consequences of widespread nanotechnology use, and how can we mitigate them?
5. How might communities be affected by the disposal and degradation of nanomaterials?
6. How do people perceive the risks and benefits of nanotechnology in environmental clean-up and conservation efforts?

APPLICATIONS OF NANOMATERIALS (OR) NANOPARTICLES

- Nano-technologyfindssignificantimpactonallmostalltheindustriesandall areas of society.
- Since nano-materials possess unique beneficial chemical, physical and mechanical properties, they can be used for a wide variety of applications

I. Medicine

- **Nanodrugs:** Nanomaterials are used as nanodrugs for the cancer and TB therapy.
- **Laboratories on a chip:** Nanotechnology is used in the production of laboratories on a chip.
- **Nano-medibots:** Nanoparticles function as nano-medibots that release anti- cancer drug and treat cancer.
- **Gold-coated nanoshells:** It converts light into heat, enabling the destruction of tumours.
- **Gold nanoparticles as sensors:** Gold nano particles undergo colour change during the transition of nano particles.
- **Protein analysis**: Protein analysis can also be done using nano materials.
- **Gold nanoshells for blood immunoassay:** Gold nano shells are used for blood immuno assay.

- **Gold nanoshells in imaging:** Optical properties of the gold nano shells are utilized for both imaging and therapy.
- **Targeted drug delivery using gold nanoparticles:** It involves slow and selective release of drugs to the targeted organs.
- **Repairing work:** Nanotechnology is used to partially repair neurological damage.

II. INDUSTRIES

(i) As Catalyst

- It depends on the surface area of the material.As nano-particles have an appreciable fraon of their atom at the surface, its catalytic activity is good.

Example: Bulk gold is chemically inert; whereas gold nano-particles have excellent catalytic property.

(ii) Inwaterpurification

- Nano-filtration makes use of nano-porous membranes having pores smaller than 10nm.Dissolved solid sand colour producing organic compounds can be filtered very easily from water.
- Magnetic nano-particles are effective in removing heavy metal contamination from waste water.

(iii) In fabric industry

- Theproductionofsmart-clothingispossiblebyputtinganano-coatingonthe fabric.
- Embedding of nano-particles on fabric makes them stain repellent.
- Sockswithembeddedsilvernano-particlesfillsallthebacteriaandmakesit odour free.

(iv) InAutomobiles

- Incorporation of small amount of nano-particles in car bumpers can make them stronger than steel.
- Specially designed nano-particles are used as fuel additive to lower consumption in vehicles.

(v) In food industry

- The inclusion of nano-particles in food contact materials can be used to generate novel type of packing materials and containers.

(vi) In energy sector

- In solar power, nano-technology reduces the cost of photovoltaic cells by 10 to100 times.

III. In Electronics

- Quantum wires are found to have high electrical conductivity.
- The integrated memory circuits have been found to be effective devices.
- A transistor called NOMFET,(Nanoparticle organic memory field effect transistor) is

created by combining gold nano particles with organic molecules.