

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**B.Tech. winter 2022-23 Examination**

**Semester: 7****Subject Code: 203109437****Subject Name: Nanomaterials and Surface Engineering****Date: 11/10/2022****Time: 10:30am to 1:00pm****Total Marks: 60****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

**Q.1 Objective Type Questions -****(15)**

1. If the particle sizes are in the \_\_\_\_\_ nm ranges, they are generally called nano-particles or materials.
2. Who gave the first talk on nanotechnology?
3. Who envisioned self-replicating 'nanobots', i.e., self-replicating robots at the molecular scale?
4. Higher the fineness of nanomaterials \_\_\_\_\_ will be the surface area.
  - a) Higher
  - b) Lower
5. The catalytic activities become pronounced as the size of the catalyst increases.
  - a) True
  - b) False
6. \_\_\_\_\_ is the adhesion of atoms, ions or molecules from a gas, liquid or dissolved solid to a surface.
7. Photo Lithography is an example of
  - a) Top-down approach
  - b) Bottom-up approach
8. Micropore have diameter in the range of 2-50 nm
  - a) True
  - b) False
9. Interest in supercritical fluids arose specially in the year \_\_\_\_\_
10. In which year Pt had been successfully applied to the synthesis of sulfuric acid?
11. \_\_\_\_\_ are natural or synthetic crystalline aluminosilicates, which have a repeating pore network and release water at high temperature.
12. Give an example of Nano functionalized Membranes based polymer membrane.
13. Diffusivity of a supercritical fluid can be 100 times more than a liquid.
  - a) True
  - b) False
14. \_\_\_\_\_ is a phenomenon whereby a substance is released from or through a surface.
15. The full form of IUPAC is \_\_\_\_\_

**Q.2 Answer the following questions. (Attempt any three)****(15)**

- A) Explain all the essential parameters to be considered in case of supercritical fluids.
- B) What are the factors affecting the Performance of Nanocatalysts.
- C) Explain different types of industrial adsorbents.
- D) Explain the requirements of Template Based Synthesis.

**Q.3 A) Define nanomaterials. Explain different types of nanostructures highlighting their degree of freedom and degree of confinement.****(07)****B) Define nanoporous material. Explain the properties and characteristics of nano porous materials.****(08)****OR****B) Explain different types of nano membrane filtration process. Explain all the nano membrane properties.****(08)****Q.4 A) Explain Electrospinning process with the help of schematic diagram.****(07)****OR****A) Explain electrophoretic deposition with the help of schematic diagram.****(07)****B) Explain the phase diagram for supercritical fluids. Enlist the critical temperature and pressure for CO<sub>2</sub> and H<sub>2</sub>O.****(08)**