

**PARUL UNIVERSITY**  
**FACULTY OF ENGINEERING & TECHNOLOGY**  
**B.Tech., Summer 2018 – 19 Examination**

**Semester: 6****Subject Code: 03103380****Subject Name: Nanotechnology****Date: 09/05/2019****Time: 10:30 am to 01:00 pm****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 - ( Fill in the blanks, one word answer, MCQ-not more than Five in case of MCQ) (All are compulsory) (Each of one mark) (15)**

1. Define Nanotechnology
2. Define the term Ageing.
3. What are the major advantages of sol-gel technique?
4. What is Infrared Region?
5. What is Bragg's law?
6. A Nanometre is a unit of length in the metric system, equal to \_\_\_\_\_
7. 3D Vibratory Mill is also known as a \_\_\_\_\_
8. Microwave techniques eliminate the use of \_\_\_\_\_
9. The prefix "nano" comes from a
  - a. French word meaning billion
  - b. Greek word meaning dwarf
  - c. Spanish word meaning particle
  - d. Latin word meaning invisible
10. Which nanomaterial have properties such as dirt repellent, hydrophobic, cosmetics & stain resistant
  - a. Zinc Oxide
  - b. Silver Ion
  - c. Silicon Oxide
  - d. Gold Ion
11. Richard Feynman is often credited with predicting the potential of nanotechnology. What was the title of his famous speech given on December 29, 1959?
  - a. There is a tiny room at the bottom
  - b. Things get nanoscopic at the bottom
  - c. Bottom? What bottom?
  - d. There is plenty of room at the bottom
12. The term "Nano-technology" had been coined by Norio Taniguchi in :
  - a. 1974
  - b. 1984
  - c. 1986
  - d. 2001
13. Hydrothermal synthesis is typically carried out in a pressurized vessel called:
  - a. Hot air oven
  - b. Muffle Furnace
  - c. Autoclave
  - d. Water Bath
14. Nano-particles can get into the body through the skin, lungs and digestive system, thus creating free radicals that can cause cell damage. T/F
15. Nanotechnology may make it possible to manufacture lighter, stronger, and programmable materials. T/F

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

- A) What are the differences between SEM and TEM?
- B) What are the applications of XRD?
- C) What is the principle of Ball milling? What are the difference between 1D Vibratory Mill and 3D Vibratory Mill? Explain with Diagram.
- D) What is laser pyrolysis?

**Q.3 A) Explain about the working and main component of XRD with diagram. (07)**

- B) Write a note on various component, sample preparation and working of SEM. (08)**

**OR**

- B) Write a note on: (08)**

1. Hydrothermal synthesis method
2. Solvothermal synthesis method
3. Sol-gel Method

**Q.4 A) What is the sample analysis process in FTIR? Explain with Diagram. (07)**

**OR**

- A) What is the basic principal of TEM? Explain with diagram about the instrument component and sample preparation in TEM. (07)**

- B) Write about the two approaches used in the synthesis of nanomaterials. Explain in details about the physical vapor deposition method along with diagram. (08)**