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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

END TERM EXAMINATION – JAN 2023

Course Code: MEC 103

Course Name: Nanotechnology [Open Elective-1]

Program : B. Tech

Date: 24-JAN-2023

Time: 1.00PM to 4.00PM

Max Marks: 100

Weightage: 50%

Instructions:

- (i) Read the all questions carefully and answer accordingly.
- (ii) Calculator is allowed during the exam

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries 5 marks.

(6Qx 5M= 30M)

- 1 What are Nano materials? List out the applications of Nano materials. (C.O. No.1) [Knowledge]
2. What are the differences between Top down and bottom up approach?(C.O. No.1) [Knowledge]
3. What are the different classifications of Nano materials based on dimensions? Explain with suitable diagram. (C.O. No.2) [Knowledge]
- 4 With suitable diagram explain conventional lithography process. (C.O. No.3) [Knowledge]
- 5 What are Carbon Nano tubes? What are the applications Carbon Nano tubes? (C.O. No.4) [Knowledge]
6. What are Nano fluids? List the different methods of preparation of Nano fluids? (C.O. No.5) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries 10 marks.

(4Qx10M=40M)

- 7 The process which uses UV or X ray to transfer geometric shapes on a mask to the surface of a silicon wafer. Identify the process and explain with suitable diagram. (C.O.No.3) [Comprehension]
8. Humans have not shown interest to mimic natures millions of years of evolution, because nature is undoubtedly the most experienced and tested laboratory ever available to us and capable of making sophisticated materials, capturing energy, self-healing, and storing information with incredible efficiency. Identify any three Nano structures in nature and explain?

9. Method which uses plasma as an ionized gas and to create potential difference between two electrodes to produce Nano materials. Identify the process explain with suitable diagram.

(C.O.No.3) [Comprehension]

10. Instrument that produces images of a sample by scanning the surface with a focused beam of electrons. The electrons interact with atoms in the sample, producing various signals that contain information about the surface topography and composition of the sample. Identify the instrument and explain with suitable diagram.

(C.O.No.4) [Comprehension]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries 15 marks.

(2Qx15M=30M)

11. One of the most fundamental difference between Nano materials and large scale materials is that Nano scale materials have an extraordinary ratio of surface area to volume. Write surface to volume ratio equations for sphere, cylinder and cube.

(C.O. No. 2) [Application]

12. X-ray powder diffraction (XRD) is a rapid analytical technique primarily used for phase identification of a crystalline material and can provide information on unit cell dimensions. With suitable diagram explain the principle and working of XRD.

(C.O. No. 4) [Application]