

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JUN 2023**

Semester : Semester IV - 2021

Course Code : MEC3009

Course Name : Sem IV - MEC3009 - Nanotechnology

Program : MEC

Date : 16-JUN-2023

Time : 9.30AM - 12.30PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS

(5 X 2 = 10M)

1. What is the standard form of SEM and TEM?
(CO3)[Knowledge]
2. Who discovered fullerene?
(CO4)[Knowledge]
3. Nanobots are used in drug delivery. True or False
(CO1) [Knowledge]
4. The size of the dendrimer nanosystem is around _____ ?
(CO1) [Knowledge]
5. What is the standard form of AFM? and who found the term Nanotechnology?
(CO4,) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(6 X 10 = 60M)

6. List the top-down and bottom-up approach of Nanoparticle production. Explain anyone method of top-down approach in brief.
(CO2,) [Comprehension]

7. The Nanomaterial class of materials is extremely broad because it can include all the previous classes of materials, provided they are composed of a structural component at the nanoscale or they exhibit one of the dimensions at the nanoscale. Explain the classification based on the number of dimensions and its characteristics, which are not confined to the nanoscale range (<100nm).
(CO2) [Comprehension]
8. Humans have not shown interest to mimic nature's 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 two Nano structures in nature and explain?
(CO1) [Comprehension]
9. With sketch classify the Bottom-up/Chemo-physical Nanoparticle production processes and Explain the Gas phase processes.
(CO3)[Comprehension]
10. Write a brief note on Quantum dots.
(CO4)[Comprehension]
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.
(CO3) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

(2 X 15 = 30M)

12. Write the importance of electron microscopes and classify them. Explain the SEM with a neat sketch.
(CO4) [Application]
13. Write a brief note on following.
a. Why and How efforts were taken for enhancing heat transfer in fluids?
b. Explain in brief about Nano fluid and its thermo-physical properties.
c. Application of Nanofluids.
(CO5) [Application]