



Roll no.

राष्ट्रीय प्रौद्योगिकी संस्थान, हमीरपुर
National Institute of Technology, Hamirpur
M. Tech./Ph.D. (Chemical Engineering) - 1st Semester
End Exam (December, 2020)
CH-718 NANOSCIENCE AND TECHNOLOGY

Duration: 2 hrs

Max. Marks: 50

Note: *This question paper consists of four questions and one page.*

- *Attempt all questions.*
- *Assume appropriate data wherever necessary*

Q1. Attempt the following.

[3×5=15]

- List the major techniques used for nanofabrications. Which particular technique is more convenient and why ?
- Write down the chemical reaction involved in the synthesization of Pt and Pd particles separately using reduction process.
- Write down at least four advantages and disadvantages of scanning probe microscopy.
- What is electron microscopy ? How is it superior to optical microscope. List any three type of electron microscopy.
- Write down the different modes of classification of Nanomaterials along with brief discussion and examples.

Q2. Attempt the following;

[5+5+5=15]

- Show mathematically that the surface to volume ratio of nanoparticle is much higher than that of the bulk particle of the identical material.
- Describe briefly the deposition of some oxide based nanocrystalline thin film via sol-gel dip coating technique along with chemical reactions.
- Draw the schematic process illustration for the multi-scale simulation methodology between time and length scales.

Q3. Attempt the following;

[6+6+6+2=20]

- Explain the electrical, magnetic, optical, thermal, and mechanical properties of nanostructured materials in detail.
- Explain the synthesis of Nanoparticles through Homogenous and Heterogenous nucleation along with chemical reactions.
- Explain the synthesis of carbon nanotube by LASER-Ablation process with neat sketch.
- Write down the significant parameters of CVD process.

----- All The Best -----