

M.Sc.(Phy.) Semester - 3 (CBCS) Examination

Nov/Dec-2023 (NEW COURSE)

Physics and Chemistry of Nanomaterials (Core (New))

Time: 2:30 Hours

Marks: 70

Instructions:

1. All questions are compulsory.
 2. Figures to the right indicate marks.
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Que.1 Answer in brief any **seven**: (14)

1. Define nanoscience and nanotechnology.
2. Write the names of various carbon derivatives.
3. List various fabrication methods for nanomaterials.
4. Give the principle of working of AFM.
5. What are nanopores?
6. Give the importance of nanomaterials in nanotechnology.
7. Discuss in brief the relation between particle size and surface area.
8. Define Molecular nanomachines.
9. Discuss in brief the classification of nanomaterials based on their dimensionality.
10. What is the principle of RBS?

Que.2 Answer any **two** of following questions: (14)

1. Discuss in detail graphite and diamond.
2. Write a note on carbon nanotubes.
3. Write notes on fullerene and graphene.

Que.3 (A) Explain the nanoscience of zinc oxide and titanium dioxide in detail. (07)

(B) Discuss in detail metal nanoparticles with the examples of (i) silver, (ii) gold, (iii) iron (07)
and (iv) copper nanoparticles.

OR

Que.3 (A) Discuss in detail the top down methods: (i) ball milling and (ii) inert gas condensation. (07)

(B) Write a note on sol-gel method. (07)

Que.4 Answer any **two** of following questions: (14)

1. Write notes on XRD characterization tool for nanomaterials. How SAXS becomes more effective in structure determination?
2. Write notes on SEM and TEM techniques for materials characterizations.
3. What is SPM? Write a note on AFM.

Que.5 Answer any **two** of following questions: (14)

1. Discuss in detail various physical properties of nanomaterials.
2. Write notes on QCM and MEMS.
3. What are sensors? Describe the nanosensors based on the quantum size effects.
4. Define nanomedicine and discuss various approaches in developing nanomedicines.
