

M.Phil. DEGREE EXAMINATION,
DECEMBER 2011

Nanoscience and Technology

RESEARCH METHODOLOGY AND BASIC OF NANOSCIENCE

(CBCS - 2011 onwards)

Time : 3 Hours

Maximum : 75 Marks

Answer **all** questions.

(5 × 15 = 75)

All questions carry equal marks.

1. (a) Explain about searching of chemical literature, chemical substance index and other data base in detail.
Or
(b) Explain in detail about developing technical specifications, patenting of nanomaterials and IPR impacts.
 2. (a) Explain in detail about the use of MS office and Excel data for the researchers.
Or
(b) Explain in details about Molecular simulations and how it is useful for nanotechnology.
 3. (a) (i) Explain in detail with suitable examples about top down and bottom up approach of preparation of nanomaterials?
(ii) Explain Moore's Law.
Or
(b) (i) Describe in detail the various synthetic techniques of carbon nanotubes.
(ii) How are mechanical properties of CNTs different from conventional materials?
 4. (a) Explain in detail about the advantages of metal, semiconductor, ceramic polymer nanocomposites. Compare their advantages with natural nanocomposite materials.
Or
(b) What makes nanoparticles attractive in biology? What are their applications? Explain with proper examples.
 5. (a) Write an essay about the principles, instrumentation of UV-Visible spectroscopy with its applications in the field of characterizing nanoparticles.
Or
(b) Write an essay about the instrumentation and applications of TEM.
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ADVANCES IN NANOSCIENCE AND TECHNOLOGY

(CBCS - 2011 onwards)

Time : 3 Hours

Maximum : 75 Marks

Answer **all** questions.

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(5 × 15 = 75)

1. (a) Explain the working principle of rotary pump and diffusion pump with neat diagram?
(b) Distinguish thermal evaporation from sputtering.

Or

- (c) Explain in detail the working principle and instrumentation for molecular beam epitaxy.
(d) Write a short note on thin film deposition using plasma arc method.
2. (a) What is SILAR? Explain how the nanoparticles are prepared using SILAR method.
(b) What is emulsion? Describe the reverse micelle method.
(c) What is self assembly?

Or

- (d) Discuss schematic diagram of CVD and explain its process. How carbon nanotubes are prepared by using CVD?
(e) Give an account on chemical modification and chemical interaction of nanomaterials.
3. (a) Describe in detail DNA analyser as Biochip.
(b) Explain the function of DNA and explain in detail about the DNA microarray.

Or

- (c) What is biomolecular gate? Explain in detail about the nanosuspension formulations?
(d) Describe the function of proteins in molecular nanoelectronics.
4. (a) What is GMR? Explain the interlayer exchange coupling in the coupled magnetic thin films.
(b) What is Coulomb blockade effect? Explain the principle and operation of SET.

Or

- (c) List the different types of lithographic technique? Explain one method with suitable diagram.

- (d) What are magnetic switches?
 - (e) Write short notes on multilayer thin film domain wall and magnetic reversal in thin films.
5. (a) Write the merits and demerits of applying nanoparticles in human body.
- (b) Describe in detail the toxicity analysing process of nanoparticles.

Or

- (c) Give an account on safty of carbon nanotubes in the human body.
 - (d) Explain in detail the role of nanoparticles deposites in the Brain.
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