

2018
CHEMISTRY
CHM:206
NANOCHEMISTRY
Full Marks: 40
Time: 1½ Hours

The figures in the margin indicate full marks for the questions :

1. Answer the following questions (any **four**) : 5x4=20
- (a) Write a short note on semiconductor nanoparticles with suitable examples. 5
 - (b) How particle size of nanomaterial is studied? Discuss how SEM and HRTEM can be used for characterization of nanomaterials. 2+3=5
 - (c) Discuss the synthesis of oxide nanoparticles by thermolysis or chemical method. 5
 - (d) Discuss briefly sea electron method. 5
 - (e) What are the general principles of sol-gel processing? Highlight the advantages of electrodeposition for the synthesis of nanoscale materials. 5
2. Answer the following questions (any **two**) : 5x2=10
- (a) Explain with examples the difference between the top-down and bottom up methods of fabrication of materials. Give one advantage and one disadvantage for each synthesis method.
 - (b) Draw a schematic diagram of a core-shell nanoparticle. Briefly describe how core-shell nanoparticles could be made using either vapour phase or solution based techniques?
 - (c) Nanotubes are widely known for carbon. Find an example of an inorganic nanotube not based on carbon and describe its synthesis and

properties as compared to the corresponding bulk material and also compare its structure to the carbon nanotube.

3. Answer the following questions (any two) : 5x2=10

- (a) Discuss electrical and optical properties of nano particles. How they are useful?
- (b) What do you understand by Quantum dots? Explain with examples. How quantum dots are useful?
- (c) Write a short note on quantum confinement.

★ ★ ★ ★ ★