2019

M.Sc.

2nd Semester Examination

CHEMISTRY

Paper - CEM 204

Full Marks : 40 Time : 2 Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

1. Answer any *four* questions from the following : 2×4

   (a) Explain what is meant by Nanotechnology ?

   (b) How does a ligand shell stabilize the nanoparticles ?

   (c) What is Ostwald Ripening process ? How does it play a role in synthesis of nanoparticles ?

   (d) Why do we observe a non smooth variation in the ionization energy with respect to its nuclearity for nanoclusters of sodium ?

[Turn Over]

(e) How would you prepare an organo sol by phase transfer technique ?

(f) Why do we observe red shift in the extinction spectra of nanoparticles with its increasing size ?

(g) What do you mean by surface Plasmon resonance band for Ag/Au nanoparticles ?

(h) What is critical size after which a material behaves like perfect metal ?

2. Answer any *four* questions from the following : 4×4=16

(a) Why chemical methods are more advantageous than the physical methods in the synthesis of nanoparticles ? Explain with suitable example.

(b) Discuss how nano particles can be used for the purification of water.

(c) Why we want to use nano fertilizers ? Write down the types of nano fertilizers used in agriculture.

(d) Why nano particles are used in sunscreen? Explain with suitable example.

(e) How does smart drugs work ? Explain with suitable example.

(f) What are the driving forces for the stabilization of nanoparticle synthesis in organic medium or in aqueous medium ? What are the driving forces for the stabilization of organo sols and hydro sols ?

(g) What are the solid and fluid lipids ? What are unilamellar and multilamellar vesicles ?

(h) Describe, in brief, the method of hot homogenization technique in preparing the nanostructured lipid carriers.

3. Answer any *two* questions from the following : 8×2=16

(a) Write notes on the method for the synthesis of nanoparticles by borohydride reduction and alcohol reduction. Mention the advantages and disadvantages of each.

(b) What do you mean by drug delivery system ? Give some examples of drug delivery method. Compare and contrast the use of liposome and solid lipid nanoparticles as drug delivery systems.

(c) What are the minimum number of metal atoms to complete the first shell ? What is the relation between the fraction of atoms exposed to the surface with the nuclearity in case of a nanoparticle ? What are the advantages of

nanoscience in molecular and cell biology ? How can functionalized gold nanoparticles be used in the treatment of cancer ?

(d) Why are the x-ray diffractogram for nanoparticles less defined than the corresponding bulk material ? Why Au nanoparticles in combination with metal oxide act as a better catalyst ? How can one control the size of nanoparticle in w/o microemulsion ? Why are thiols considered as better capping agent ?