



DXX-003-020306

Seat No. _____

M. Sc. (Sem. - III) (CBCS) Examination

May / June - 2015

Physics: ID - 02

(Physics and Chemistry of Nanomaterials)

Faculty Code : 003

Subject Code : 020306

Time : 3 Hours]

[Total Marks : 70

Instructions: (1) Attempt all questions.

(2) All questions carry equal marks.

(3) Mathematical symbols have equal meanings.

- 1** Answer in brief any seven : **14**
- (a) Define nanomaterials and nanotechnology. **2**
 - (b) What are different core-shell nanostructures? **2**
 - (c) Describe the synthesis of ZnO nanoparticles using controlled release of anions. **2**
 - (d) Define micro and mesoporous materials. **2**
 - (e) What are the three basic nucleation modes of film growth? **2**
 - (f) Explain in brief the Scherer's formula for crystallite size determination. **2**
 - (g) Give the principle of working of AFM. **2**
 - (h) What are applications of nanotribology? **2**
 - (i) What are molecular machines? **2**
 - (j) What are nanopores? **2**
- 2** Answer any two of following questions: **14**
- (a) Describe synthesis of nanoparticles using homogeneous nucleation methods. How to synthesize Ag nanoparticles using UV illumination? **7**

- (b) What are the advantages of Sol-Gel processing? 7
Describe the synthesis of spherical colloidal α -Fe₂O₃ nanoparticles by Forced Hydrolysis method.
- (c) Describe various heterogeneous nucleation methods 7
for synthesis of different nanoparticles.
- 3** (a) Distinguish between CVD and ALD techniques of 5
nanostructured film growth.
- (b) Describe the principle and working of TEM and SEM 5
techniques.
- (c) Describe the construction and working of QCM. 4
- OR**
- (a) What are the various kinds of carbon nanotubes? Give 5
their classification.
- (b) What are carbon fullerenes? Give various examples 5
and the general method for their synthesis.
- (c) Give the properties and applications of carbon 4
nanotubes.
- 4** Answer any two of following questions: 14
- (a) Discuss in detail the spin coating and dip coating 7
techniques of growing sol-gel based nanomaterials thin films.
- (b) Describe the formation and properties of ordered 7
microporous and mesoporous materials.
- (c) Write a note on XRD and SAXS techniques for 7
nanomaterials characterizations.
- 5** Answer any two of following questions: 14
- (a) Define nanomedicine and discuss various approaches in 7
developing nanomedicines.
- (b) What are organic and inorganic hybrids? Describe 7
class - I and class - II Hybrids.
- (c) Discuss various diagnostic and therapeutic applications 7
of nanomedicines.
- (d) What are sensors? Describe the nanosensors based on 7
the quantum size effects.