

Roll No. ....

78612

M. Sc. 4th Semester (Physics), (New)  
Examination – December, 2014

Physics of Nano Materials (New)

Paper : XVI

*Time : Three Hours ]*

*[ Maximum Marks : 80*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

*Note : Attempt five questions in all. Question No. 1 is compulsory. Attempt one question from each Unit. All questions carry equal marks.*

1. (a) Discuss variation of density of states with size of crystal in brief. 4
- (b) Give idea of quantum well in brief. 4
- (c) Why Physical properties changes in case of nanomaterials when particle size reduces to nanoscale ? 4

(d) Name different methods for the synthesis of nano-materials. Give Sol-Gel method briefly. 4

#### UNIT - I

2. Give a qualitative analysis of band theory of solids and hence make distinction between insulators, conductors and semiconductors on the basis of it. 16
3. Discuss free electron theory (qualitative idea) and its features. 16

#### UNIT - II

4. Discuss electron confinement in one-dimensional well potential. 16
5. (a) Explain quantum wires, 8  
(b) Discuss quantum dot. 8

#### UNIT - III

6. (a) Discuss shift in Photoluminescence peaks in case of nanomaterials. 9  
(b) Discuss increase in width of XRD peaks of nano particles. 7
7. (a) Discuss variation of Raman spectra in case of Nanomaterials. 9  
(b) How will you find size of nanomaterials? 7

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#### UNIT - IV

8. Discuss the synthesis of nanomaterials by :

- (i) Ball milling technique. 8  
(ii) Cluster beam evaporation technique. 8
9. Discuss the synthesis of materials by :
- (a) Ion beam deposition technique. 8  
(b) Chemical bath deposition with capping technique. 8

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