



HP-003-020306 Seat No. _____

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

May / June - 2017

Physics : ID - 02

[Physics and Chemistry of Nanomaterials]

Faculty Code : 003

Subject Code : 020306

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :**
- (1) Attempt all questions.
 - (2) All questions carry equal marks.
 - (3) Mathematical symbols have equal meanings.

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|----------|---|-----------|
| 1 | Answer in brief any seven : | 14 |
| | (a) Define nanomaterials and nanotechnology. | 2 |
| | (b) Give the examples of top-down and bottom-up approaches. | 2 |
| | (c) What are different aspects of nanoparticles grown using ball milling process ? | 2 |
| | (d) Describe the hydrated electrons ? | 2 |
| | (e) Discuss the preparation of Ag nanoparticles using sono-chemical reduction method. | 2 |
| | (f) What is knudsen number ? | 2 |
| | (g) Describe Quantum Dot in brief. | 2 |
| | (h) What is application of Nanotribology ? | 2 |
| | (i) Describe EDS and XPS in brief. | 2 |
| | (j) Draw a diagram of AFM. | 2 |

- 2 Answer any two of following questions : 14
- (a) Describe the synthesis of nanoparticles using homogeneous nucleation methods. 7
 - (b) Discuss various heterogeneous nucleation methods for synthesis of different nanoparticles. 7
 - (c) Discuss in detail the fundamental aspects of thin film growth. 7
- 3 (a) Discuss the thermal evaporation process for thin film growth. 7
- (b) Provide the detailed comparison between evaporation and sputtering techniques. 7
- OR**
- (a) Discuss in detail various physical properties of nanomaterials. 7
 - (b) Define nanomedicine and discuss various approaches in developing nanomedicines. 7
- 4 Answer any two of following questions : 14
- (a) Explain PL, IR and Raman spectroscopy in detail. 7
 - (b) Describe the principle and working of STM and AFM techniques. 7
 - (c) What do you mean by nanosensor ? Describe the nanosensors based on quantum size effects. 7
- 5 Answer any two of following questions : 14
- (a) Write a note on molecular beam epitaxy for thin layer growth. 7
 - (b) Discuss in detail the sol-gel growth of thin films. 7
 - (c) Write a short note on SEM and TEM. 7
 - (d) Write a note on molecular devices. 7