



**PI-003-0496001**

Seat No. \_\_\_\_\_

**B. Sc. / M. Sc. (Applied Physics) (Sem. VI)  
(CBCS) Examination**

**August - 2020**

**Elements of Nanoscience & Nanotechnology :  
Paper - XXI  
(New Course)**

**Faculty Code : 003**

**Subject Code : 0496001**

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

[Total Marks : 70

- Instructions :** (1) All questions are compulsory  
(2) Numbers in the right indicate marks

- 1** Attempt any **seven** short questions : **14**
- (1) List various applications of Nanotechnology.
  - (2) What are core shell nanostructures? Give suitable examples.
  - (3) Define the terms Nanoscience, Nanomaterial and Nanotechnology.
  - (4) Draw a well-labelled diagram of SOL GEL Synthesis method.
  - (5) Write full forms of CVD, PVD, MBE, PES & XPS.
  - (6) What are Carbon Fullerenes?
  - (7) Draw a well-labelled diagram of AFM.
  - (8) Write down the principle of XRD.
  - (9) What are properties of CNTs ?
  - (10) What are Stokes' and Anti Stoke's lines in Raman spectrum?

- 2** (A) Write answers of any **two** : **10**
- (1) Differentiate between top down and bottom up processes of nanomaterial synthesis.
  - (2) Describe the synthesis of nanomaterials using CVD method.
  - (3) Explain various steps involved in the SOL GEL synthesis of nanoparticles.
  - (4) What is meant by homogeneous nucleation? Describe in detail.
- (B) Write answer of any **one** : **4**
- (1) Explain the sputtering method for the growth of nanostructured films.
  - (2) Describe various Nanomaterials based on their classification.
- 3** (A) Write answers of any **two** : **10**
- (1) Write the principle and working of (SEM).
  - (2) Write a note on X-ray photoelectron Spectroscopy.
  - (3) Describe the XRD technique used for structural characterization of nanomaterial.
  - (4) Draw a well-labelled diagram of MBE. Explain the construction and working.
- (B) Write answer of any **one** : **4**
- (1) What are microporous and mesoporous materials? Give examples of each.
  - (2) Explain the use of Raman Spectroscopy in the nanomaterial characterization.

- 4 (A) Write answers of any **two** : 10
- (1) Explain the use of Photoluminescence spectroscopy in nanomaterial characterization.
  - (2) Differentiate between Class I and Class II Organic-inorganic hybrid nanostructures.
  - (3) Describe the synthesis and applications of fullerenes.
  - (4) Describe the synthesis of nanomaterial using PVD method.
- (B) Write answer of any **one** : 4
- (1) Write a note on Emergence of Nanoscience and Nanotechnology.
  - (2) Describe the construction and working of PLD.
- 5 (A) Write answers of any **two** : 10
- (1) What is meant by Targeted Drug Delivery? How nanomaterials and nanotechnology is useful in nanomedicines and health care?
  - (2) Discuss the applications of nanotechnology in Modern electronics and computer technology.
  - (3) What is meant by Nanophotonics? Give suitable examples of nanomaterials used in Nanophotonics.
  - (4) Write a note on nanotechnology and environment.
- (B) Write answer of any **one** : 4
- (1) Write a note on Past, Present and Future of Nanotechnology.
  - (2) Explain in detail applications of Nanomaterial in agriculture and energy harvesting.