DM-003-0496001 Seat No. _____

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

March – 2022

Elements of Nanoscience and 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) Write full forms of CVD, PLD, ALD, PVD and MBE.

(2) What are microporous and mesoporous materials?

(3) List various applications of Nanotechnology.

(4) What are core shell nanostructures? Give suitable examples.

(5) Classify nanomaterials using suitable diagrams.

(6) What are Carbon Fullerenes?

(7) Draw a well-labelled diagram of SOL GEL Synthesis method.

(8) Define the terms Nanoscience and Nanotechnology.

(9) What are Stoke and Anti stoke lines in Raman spectrum?

(10) Write down the principle of XRD.

2 (A) Write answers of Any **Two** : **10**

(1) Describe the synthesis of nanomaterials using CVD method.

(2) Explain various Nanomaterials based on their classification.

(3) Describe the synthesis of nanomaterial using PVD method.

(4) Write a note on Past, Present and Future of Nanotechnology.

(B) Write answer of Any **One** : **4**

(1) Differentiate between top down and bottom up processes of nanomaterial synthesis.

(2) What is meant by homogeneous nucleation? Describe in detail.

3 (A) Write answers of Any **Two** : **10**

(1) Describe the synthesis and applications of fullerenes.

(2) Describe synthesis and properties of carbon nano tube (CNTs).

(3) Describe various steps involved in the SOL-GEL synthesis of nanoparticles.

(4) Write the principle and working of (AFM).

(B) Write answer of Any **One** : **4**

(1) Explain the use of Photoluminescence spectroscopy in nanomaterial characterization.

(2) Write a note on X-ray photoelectron Spectroscopy.

4 (A) Write answers of Any **Two** : **10**

(1) Explain the sputtering method for the growth of nanostructured films.

(2) Explain in detail applications of Nanomaterial in agriculture and energy harvesting.

(3) What are nanomedicines? Write a brief note on their use and applications.

(4) Discuss the applications of nanotechnology in Morden electronics and computer technology.

(B) Write answer of Any **One** : **4**

(1) Write a note on Emergence of Nanoscience and Nanotechnology.

(2) Write the principle and working of (TEM).

5 (A) Write answers of Any **Two** : **10**

(1) Describe the laser ablation method of nanomaterial synthesis.

(2) Describe the XRD technique used for structural characterization of nanomaterial.

(3) Differentiate between Class I and Class II Organic-inorganic hybrid nanostructures.

(4) Explain the use of Raman Spectroscopy in the nanomaterial characterization.

(B) Write answer of Any **One** : **4**

(1) How nanomaterials and nanotechnology is useful in nanomedicines and health care?

(2) Draw a well-labelled diagram of MBE. Explain the construction and working.
