Roll No. : .....

Total No. of Questions : **11**] [Total No. of Printed Pages : **3**

BFMS–459

M.Sc. (Final) Examination, 2023

PHYSICS

Paper - VIII (B)

(Physics of Nanomaterials and Environmental Physics)

*Time : **3** Hours*] [*Maximum Marks : **75***

Section–A **(Marks : 2 × 10 = 20)**

Note :– Answer all *ten* questions (Answer limit **50** words). Each question carries **2** marks.

Section–B **(Marks : 5 × 5 = 25)**

Note :– Answer all *five* questions. Each question has internal choice (Answer limit **200** words). Each question carries **5** marks.

Section–C **(Marks : 10 × 3 = 30)**

Note :– Answer any *three* questions out of five (Answer limit **500** words). Each question carries **10** marks.

Section–A

1. (i) Define Nanostructures.

   (ii) What is meant by Density of States (DOS) ?

(iii) Differentiate between different types of nanomaterials on the basis of particle size.

(iv) Define quantum Confinement.

(v) Write *two* bottom up and top down approaches for synthesis of nanomaterials.

(vi) Write factors affecting air pollution.

(vii) State Planck's law of Radiation.

(viii) What is meant by non-renewable energy sources ?

(ix) Define turbulence

(x) Differentiate between Climate and Weather.

Section–B

2. Explain fermi energy on the basis of free electron theory.

Or

Explain the variation in bandgap with size of nanoparticles.

3. Discuss the eigenvalues and eigenfunctions of an electron confined in an infinitely deep square well.

Or

Explain Raman Spectra of nanomaterials.

4. Describe Ball Milling technique for fabrication of nanomaterials with the help of a suitable diagram.

Or

Discuss briefly stratification of atmosphere.

5. Distinguish between Rayleigh and Mie Scattering.

Or

Discuss the ozone depletion layer problem.

6. Write short note on energy balance–a zero dimensional greenhouse effect.

Or

Write short notes on the following :

(i) Nuclear energy

(ii) Bioenergy

Section–C

7. What are renewable energy sources ? Describe the various renewable energy sources and their advantages.

8. Discuss in brief :

(a) Kirchhoff's law

(b) Beer's law

(c) Wien's displacement law

9. Explain the origin of bands in materials. Differentiate between insulators, semiconductors and metals on the basis of band structure. Discuss origin of bands in direct and indirect bandgap semiconductors.

10. Define a quantum well. Describe the formation of quantum dot and quantum wire using energy band diagram.

11. Describe the process of synthesis of thin films using chemical bath deposition method. Discuss various parameters on which film properties depend.