Roll No : .....

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

SP–714

M.Sc. (Final) Examination, 2021

PHYSICS

Paper - VIII (B)

(Physics of Nanomaterials and Environmental Physics)

Time : 1½ Hours] [*Maximum Marks : 75*

Section–A **(Marks : 2 × 10 = 20)**

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

(खण्ड–अ) **(अंक : 2 × 10 = 20)**

नोट :– सभी **दस** प्रश्नों के उत्तर दीजिए (उत्तर-सीमा **50** शब्द)। प्रत्येक प्रश्न **2** अंक का है।

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.

(खण्ड–ब) **(अंक : 5 × 5 = 25)**

नोट :– सभी **पाँच** प्रश्नों के उत्तर दीजिए। प्रत्येक प्रश्न में विकल्प का चयन कीजिए (उत्तर-सीमा **200** शब्द)। प्रत्येक प्रश्न **5** अंक का है।

Section–C **(Marks : 10 × 3 = 30)**

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

(खण्ड–स) **(अंक : 10 × 3 = 30)**

नोट :– पाँच में से किन्हीं **तीन** प्रश्नों के उत्तर दीजिए। (उत्तर-सीमा **500** शब्द)। प्रत्येक प्रश्न **10** अंक का है।

Section–A

2 each

1. Attempt all questions. Answers should not exceed **50** words in each question.

   (i) Distinguish between nanomaterials and bulk materials in brief.

   (ii) Write postulates of free electron model of solids.

   (iii) Distinguish between quantum well, quantum wire and quantum dot with one example of each.

   (iv) What is the meaning of photoluminescence spectroscopy ? Mention some of its uses.

   (v) Explain in brief the top-down and bottom-up techniques for fabrication of nanomaterials.

   (vi) How nanotechnology is useful for waste reduction and improved energy efficiency ?

   (vii) Give composition of air in brief.

   (viii) Distinguish between Rayleigh and Mie scattering.

   (ix) What do you mean by turbulence and turbulent diffusion ?

   (x) Name the different renewable sources of energy.

Section–B

5 each

2. Derive an expression for density of states in solids.

Or

Distinguish between conductors, semiconductors and insulators on the basis of band theory.

3. Explain any *two* techniques for particle size determination with the help of suitable diagrams.

Or

Discuss the increase in width of XRD peaks of Nanomaterials.

4. Discuss in brief the chemical bath deposition and ion beam deposition techniques for synthesis of nanomaterials.

Or

Explain Greenhouse effect and its impact on environment.

5. What are UV radiations ? What are the merits and demerits of these radiations ?

Or

Discuss briefly factors governing air, water and noise pollution.

6. Explain briefly Bio-energy, Solar energy and Nuclear energy.

Or

What are Pressure Gradient Forces ? Explain briefly.

Section–C 10 each

7. Explain band formation in solids with the help of suitable diagram.
8. Find the energy and wave function of an electron confined in an infinitely deep square well.
9. Explain Ball-Milling with the help of a neat diagram. Also, discuss its basic requirements.
10. Explain in brief different laws of radiation.
11. Discuss in detail factors governing weather and climate.