



**DAH-003-0491108**

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

**B. Sc. / M. Sc. (Sem. X) (CBCS) Examination**

**April - 2022**

**Applied Physics : Paper -15**

*C-3 Swift Heavy Ions for Material Modifications  
(New Course) (Group)*

**Faculty Code : 003**

**Subject Code : 0491108**

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

[Total Marks : 70

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

- 1 Attempt any **SEVEN** short questions (**Two** marks each) **14**
- (1) Define Screen Coulomb Potential.
  - (2) Calculate the energy of an electron in MeV having mass  $m=9.11\times 10^{-31}$  kg.
  - (3) Calculate the atomic density of Al, where,  
 $\rho = 27 \text{ gm/cm}^3$  and  $A=27$ .
  - (4) Write the full forms of SRIM and TRIM.
  - (5) Give the full form of SNICS.
  - (6) Write the application of superconducting LINAC in 15UD Tandem accelerator.
  - (7) What do you mean by self - organization ?
  - (8) Write about the important issues in nanomaterials.
  - (9) Write applications of transparent conducting oxides.
  - (10) Which type of defects responsible for the change in  $T_c$  in superconductor ?

- 2** Write the answer of any two questions : **14**
- (1) Write a detailed note on inter atomic force in solids.
  - (2) Discuss angular orbital momentum and impact parameter.
  - (3) Derive an equation for maximum energy transfer  $T_M$  in Centre of Mass coordinates.
  - (4) Discuss Scattering Cross Section in detail
- 3** Write the answer of any two questions. **14**
- (1) Give the name of different accelerators and explain 15UD Tandem accelerator with necessary figure and diagrams.
  - (2) Write the use of SRIM and TRIM simulation software.
  - (3) Give the name of different beam line of 15UD Tandem accelerator at IUAC, New Delhi and write their applications.
  - (4) Discuss ion implantation and their applications in detail.
- 4** Write the answer of any two questions. **14**
- (1) Classify the ion energy regime for different process of ion irradiation.
  - (2) Discuss precipitation of metal particles in oxide by ion irradiation.
  - (3) Write a short note on metal-dielectric nanocomposite with an example.
  - (4) Write a note on ion induced self-organization phenomena.

**5** Write the answer of any two questions. **14**

- (1) Describe the effect of SHI irradiation on the transparent conducting oxide with example.
- (2) Discuss role of ion irradiation in the structural and microstructural properties of manganite materials.
- (3) Discuss the columnar tracks and flux pinning in high  $T_C$  superconductor.
- (4) Write Explain modification in transport properties of manganite thin films by ion irradiation.

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