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ACH 553

**IV Semester M.Sc. Degree Examination, Sept./Oct. 2022
(Freshers and Repeaters) (CBCS 2016-17 Syllabus)**

APPLIED CHEMISTRY

Chemistry of Solid State and Nano Materials

Time : 3 Hours

Max. Marks : 70

Note : 1) Answer Part **A** and **any four** questions from Part **B**.
2) Figures to the **right** indicate marks.

PART – A

1. Answer the following sub divisions. **(9×2=18)**
- Explain the principle of flame fusion method of crystal growth.
 - Differentiate between perfect and imperfect crystals.
 - How are color centers formed ? Mention their importance.
 - What are superionic conductors ? Give examples.
 - Explain meissner effect.
 - Illustrate the conduction mechanism in oxide ion conductor.
 - What are quantum dots ? Mention any two of their special properties.
 - What are calixerenes ? Illustrate their reactivity.
 - Give an account of the drug dissolution rate and its impact on the biological reaction systems.

PART – B

Answer **any four** of the following : **(4×13=52)**

2. a) Discuss the principle and working of LEED technique in surface morphology studies.
- b) Describe the thermodynamics of Frenkel defect formation.
- c) Explain Wagner's theory of solid state reactions by taking a suitable example. **(5+4+4=13)**

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3. a) Explain Kirkendall effect.
b) Discuss the order-disorder transitions of solids.
c) Discuss the following nucleation and crystal growth techniques :
i) pulling and
ii) zoning. **(3+4+6=13)**
4. a) Discuss the conduction mechanism in superionic conductor by taking example of AgI.
b) Give an account of the following :
i) Type I and Type II superconductors.
ii) High and low T_c materials. **(5+8=13)**
5. a) Differentiate between the following :
i) positional order and bond orientation order in liquid crystals.
ii) twisted nematics and chiral nematics.
b) Give the classification of magnetic materials with examples.
c) Explain the magnetic properties of spinels. **(4+6+3=13)**
6. a) Outline the importance of nanomaterials. Discuss the challenges and opportunities of nanotechnology.
b) Give an account of electronic and optical properties of nanomaterials. **(5+8=13)**
7. a) Write a note on supramolecular chemistry of crown ethers.
b) Illustrate the bottom-up approach of preparation of nanomaterials.
c) Write a note on nanocomposites. **(4+4+5=13)**
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