

**K-389**

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Roll No. ....

## **MSCCH-601**

### **Solid State and Materials Chemistry**

M.Sc. Chemistry (MSCCH)

3rd Semester Examination, 2023 (Dec.)

**Time : 2 Hours]**

**Max. Marks : 70**

**Note :** This paper is of Seventy (70) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein. Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

### **SECTION–A**

#### **(Long Answer Type Questions)**

**Note :** Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

(2×19=38)

1. How metallic conducts and semiconductors are identified? Discuss their properties in the form of band theory.
2. What is the aim of artificial photosynthesis? Describe the applications and limitations of artificial photosynthesis.
3. What are molecular rectifiers and transistors discussing their theories with suitable examples?
4. Write notes on the following :
  - (a) Schottky and Frenkel defect
  - (b) Doped fullerenes as superconductors
  - (c) Disadvantages of liquid crystal power
  - (d) X-ray diffraction
5. What are organic charge transfer complexes? Give examples and explain their importance.

## **SECTION-B**

### **(Short Answer Type Questions)**

**Note :** Section 'B' contains Eight (08) short answer type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only. (4×8=32)

1. Define perfect and imperfect crystals on the basis of change in free energy.

2. Write a note on any *two* of the following :
    - (a) Crystallographic planes.
    - (b) Miller indices.
    - (c) Bravais lattices.
  
  3. What are nonstoichiometric compounds? Explain the origin of semi-conductivity in such compounds.
  
  4. Discuss the electronic properties and band theory of semiconductors.
  
  5. What materials, ferromagnetic or ferrimagnetic, would make better permanent magnets?
  
  6. Draw the following crystal structures: NaCl, CsCl, Tetragonal.
  
  7. What are surface active agents? How can it be classified?
  
  8. How Bragg's description of diffraction is different from Law?
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