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**M. Sc. (Sem. IV)
Regular/ATKT/Old ATKT/EX
Examination - May, 2023**

CHEMISTRY

Paper II

Solid State Chemistry

Time : 3 Hours

Maximum Marks : 85

Minimum Pass Marks : 31

Note : Attempt all questions.

Section A

1½×10=15

Objective Type Questions

1. Choose the correct answer :

(i) In case of lattice diffusion through a planar layer diffusion is governed by rate law :

(a) $\frac{dx}{dt} = k \cdot x$

(b) $\frac{dx}{dt} = kx^{-1}$

(c) $\frac{dx}{dt} = k \cdot x^{-2}$

(d) None of the above

(ii) Schottky defect is due to :

(a) missing of electron from normal lattice site

(b) existing of electron from normal lattice site

(c) Both (a) and (b)

(d) None of the above

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(iii) Which of the following is thermodynamically stable defect ?

- (a) Point defect
- (b) Line defect
- (c) Surface defect
- (d) Volume defect

(iv) Frenkel defect is the :

- (a) Schottky defect
- (b) Interstitial defect
- (c) Combination of (a) and (b)
- (d) None of the above

(v) Energy band gap of an insulating material is :

- (a) 0 eV
- (b) Greater than 5 eV
- (c) Less than 5 eV
- (d) Equal to 1 eV

(vi) By increasing the temperature the specific resistance of a conductor and a semiconductor :

- (a) Increases for both
- (b) Decreases for both
- (c) Increases for conductor
- (d) Decreases for semiconductor

(vii) A magnetic field exists around :

- (a) Iron
- (b) Copper
- (c) Aluminium
- (d) Moving charges

(viii) Ferrimagnetism is in :

- (a) ↑↑↑↑↑
- (b) ↑↓ ↑↓
- (c) ↑↑↑↓↓
- (d) None of the above

(ix) Which type of liquid crystal show change in colouration with temperature ?

- (a) Smectic- β
- (b) Smectic-C
- (c) Nematic
- (d) Cholesteric

(x) Liquid crystals having chiral center are :

- (a) Nematic liquid crystals
- (b) Lyotropic liquid crystals
- (c) Smectic liquid crystals
- (d) Cholesteryl liquid crystals

Section B

5×5=25

Short Answer Type Questions

2. What do you mean by Wagner's reaction mechanism ? <https://www.onlinebu.com>

Or

Why are solid state reactions difficult to occur ?

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<https://www.onlinebu.com>

3. Describe different types of colour centres.

Or

What are perfect and imperfect crystals ?

4. Describe Band Theory.

Or

What are intrinsic and extrinsic semi-conductors ?

5. What are organic metals ?

Or

What do you mean by charge transfer complexes ?

6. Write short note on any *one* of the following :

- (a) Nematic crystals
- (b) Smectic crystals

Section C

5×9=45

Long Answer Type Questions

7. What is experimental procedure used in study of solid state reaction ?

Or

What are the different kinetic parameters for solid state reactions ?

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<https://www.onlinebu.com>

8. Describe Schottky and Frenkel defects in detail.

Or

Explain strain hardening.

9. Describe the method, preparation and application of the doped polyacetylene.

Or

Explain the effect of temperature on magnetic susceptibility.

10. Write a detailed note on electrically conducting organic solids.

Or

What are superconductors ? Explain the doped fulleride superconductors with example.

11. What are liquid crystals ? How are they classified ?

Or

Discuss the ferroelectric and anti-ferroelectric liquid crystals.