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D-6343

M.Sc. (IVth Semester) Examination, 2020

CHEMISTRY

(Solid State Chemistry)

Time Allowed : Three Hours

Maximum Marks : 70

SECTION - A

Note : Attempt any ten questions. Each question carries one mark. **1×10=10**

Q. 1. (i) Pure silicon doped with phosphorus is a :

(a) Metallic conductor

(b) p-type conductors

(c) n-type semiconductor

(d) Insulator

(ii) At a temperature of absolute zero, an intrinsic semiconductor is :

(a) Conductor

(b) Insulator

(c) Semiconductor (p-type)

(d) Semiconductor (n-type)

(iii) An example of ionic crystal is :

(a) NaCl crystal

(b) Graphite

(c) Ice

(d) Cu-crystal

(iv) An example of molecular solid is :

(a) Solid CO_2

(b) SiO_2

(c) NaCl

(d) SiC

(v) Which of the following statement is appropriate for Stockbarger method ?

(a) Solidification is achieved by passing the melt through a concentration gradient.

(b) Solidification is achieved by passing the melt through a temperature gradient.

(c) Liquefaction is achieved by passing the melt through a concentration gradient.

(d) Liquefaction is achieved by passing the melt through a temperature gradient.

(vi) Which of the following oxide shows electrical properties like metals ?

(a) SiO_2

(b) MgO

(c) $SO_2(s)$

(d) CrO_2

(vii) Which of the following point defects are shown by AgBr(s) crystals ?

(1) Schottky defect

(2) Frenkel defect

(3) Metal excess defect

(4) Metal deficient defect

(a) 1 and 2

(b) 3 and 4

(c) 1 and 3

(d) 2 and 4

(viii) Amorphous solid can also be called _____.

(ix) Frenkel defect is also known as _____.

(x) Graphite is a good conductors of electricity due to the pesence of _____.

(xi) The ratio of the intensity of magnetization I to the magnetizing field H is called magnetic _____.

(xii) X-rays are _____ of wavelength ~ 1A° (10^{-10}m).

SECTION - B

Note : Attempt any five questions. Each question carries 2 marks. **2×5=10**

Q. 2. Very short answer (25-30 words) :

(i) What is crystal growth ?

(ii) Write the F-centre and hole centre with example.

(iii) Write the equation of Bragg equation.

(iv) What is ionic crystal ?

(v) What is magnetic moments ?

(vi) What is insulators with example ?

(vii) What is meant by zone melting ?

SECTION - C

Note : Attempt any five questions. Each question carries 4 marks. **5×4=20**

Q. 3. Write short answer in 250 words :

(i) What is super conductivity ? How would you explain super conductivity of metals ?

(ii) Write the principle and application of powder method.

(iii) Distinguish between a Schottky and Frenkel defects.

(iv) What are n-p type semiconductor ? Explain the fabrication of transistors.

(v) Describe the Hydogen-Oxygen cell and its applications.

(vi) Explain the Curie and Curie-Weiss laws.

(vii) Discuss the Kroger-Zeigler equation.

SECTION - D

Note : Attempt any three questions. Each question carries 10 marks. **10×3=30**

Q. 4. Write essay type answer in 500 words :

(i) Discuss the principle, instrument and application of Neutron diffraction.

(ii) (a) Describe the origin, consequences of non-stoichiometry defects.

(b) Write notes on Band theory of solid.

(iii) What is solid electrolytes ? Discuss the solid electrolyte and its application.

(iv) Write the behaviour of substance in magnetic field and mechanism of ferro and antiferro magnetic.

(v) Write the short notes on :

(i) Parabolic rate law

(ii) Organic conductors

(iii) Extrinsic semiconductors