

**D-6346**

**M.Sc. (IV<sup>th</sup> Semester) Examination, 2020**

**CHEMISTRY**

**(Material Science)**

**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) The crystal lattice has a \_\_\_\_\_ arrangement.
- (a) One dimensional
  - (b) Two dimensional
  - (c) Three dimensional
  - (d) Four dimensional
- (ii) Bravais lattice consists of \_\_\_\_\_ space lattices.
- (a) Eleven
  - (b) Twelve
  - (c) Thirteen
  - (d) Fourteen

**(2)**

- (iii) The axial relationship of a rhombohedral crystal system is given as :
- (a)  $a = b = c$
  - (b)  $a = b \neq c$
  - (c)  $a \neq b = c$
  - (d)  $a \neq b \neq c$
- (iv) X-ray diffractometers are not used to identify the physical properties of which of the following ?
- (a) Metals
  - (b) Liquids
  - (c) Polymeric material
  - (d) Solid
- (v) In diffractometers, line intensities depend on \_\_\_\_\_ and kind of atomic reflection centres in each set of plane.
- (a) Number
  - (b) Position
  - (c) Length
  - (d) Distance between lines

**(3)**

(vi) The smallest repetitive unit of the crystal structure is known as :

- (a) Atom
- (b) Compound
- (c) Unit cell
- (d) Lattice

(vii) Schottky defect defines imperfection in the lattice structure of :

- (a) Solid
- (b) Gas
- (c) Liquid
- (d) Plasma

(viii) The space lattice of graphite is \_\_\_\_\_ :

- (a) Cubic
- (b) Tetragonal
- (c) Rhombic
- (d) Hexagonal

(ix) Co-ordination numbers of  $Zn^{2+}$  and  $S^{2-}$  in the crystal structure of Wurtzite are :

**(4)**

(a) 4, 4

(b) 6, 6

(c) 8, 4

(c) 8, 8

(x) Intrinsic semiconductors at room temperature will have \_\_\_\_\_ available for conduction :

(a) Electrons

(b) Holes

(c) Both electron & holes

(d) None of the above

(xi) Which of the following is a semiconductor :

(a) Diamond

(b) Arsenic

(c) Phosphorus

(d) Gallium arsenide

(xii) Semiconductor has \_\_\_\_\_ temperature co-efficient of resistance.

**(5)**

- (a) Zero
- (b) Positive
- (c) Negative
- (d) None of the above

**SECTION - B**

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

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

- (i) What is seven crystal system ?
- (ii) What do you understand by symmetry elements ?
- (iii) What is F-centre ?
- (iv) What is an ionic conductors ?
- (v) What are liquid crystal ?
- (vi) Define super conductivity.
- (vii) What are crystal defect ? Give example.

**(6)**

**SECTION - C**

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

**Q. 3.** Short answer type (250 words) :

- (i) Discuss the structure of rock salt and rutile.
- (ii) Explain the neutron diffraction.
- (iii) What is the difference between Frenkel and Schottky defects.
- (iv) Discuss the free electron theory of metals.
- (iv) Write the short note on organic semiconductors.
- (vi) Write brief account of Vander Waals interactions.
- (vii) Explain the structure of Wurtzite.

**(7)**

**SECTION - D**

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

**Q. 4.** Essay type (more than 500 words) :

(i) (a) Describe the Band model theory of metallic state.

(b) Discuss the photo conducting materials.

(ii) Describe the principle, instrument and application of electron diffraction.

(iii) Explain the nematic, smectic and cholesteric and their applications.

(iv) Write the short notes on :

(a) Fourteen Bravais lattices

(b) Silver and copper ion (ionic conductor)

(c) Thermotropic and lyotropic

