END OF SEMESTER EXAMINATIONS, APRIL/MAY – 2017
INORGANIC CHEMISTRY - II
SUBJECT CODE: 15P3CH05

MAJOR: M.Sc. (Chemistry)   SEMESTER   : II
TIME   : 3 HOURS   MAX. MARKS: 70

SECTION – A (10 X 1 = 10)

Answer ALL the Questions:

1. What are the uses of symmetry elements?
2. Graphite is chemically more active than diamond. Explain.
3. The electrical conductivity of semiconductors increases with increase of temperature. Explain.
4. Distinguish between plane defect and line defect.
5. Define the term space lattice.
6. What are Miller indices?
7. Explain the term "aspect ratio".
8. How do the carbon based quantum dots are superior than traditional semiconductor quantum dots?
9. Distinguish between AFM and STM.
10. Distinguish between Scanning Electron Microscope and Scanning Tunneling Microscope.

SECTION – B (5 X 4 = 20)

Answer ALL the Questions:

11. a) Draw and explain the structure of
    (i) fluorite   and (ii) diamond.
                    (OR)
    b) How many atoms are there in an unit cell?
    (i) BCC   (ii) FCC   (iii) Sodium Chloride.
12. a) Explain the phenomenon of Superconductivity. Discuss the recent development in the area of Superconductors.
                    (OR)
    b) Write notes on Hall effect and its applications.
13. a) Explain the uses of X-ray analysis.
                    (OR)
    b) Describe the rotating crystal method in the structural determination of NaCl.
14. a) How would you obtain nano rods? List their applications.
                    (OR)
    b) Specify the important properties and applications of two-dimensional carbon nanotubes.
15. a) Explain the chemical vapour deposition method of synthesising nanomaterials.
                    (OR)
    b) Write the principle and applications of Atomic Force Microscope.

SECTION – C (5 X 8 = 40)

Answer ALL the Questions:

16. a) Discuss the Born-Haber cycle and its applications.
                    (OR)
    b) (i) Explain Goldschmidt radius ratio. Derive the radius ratio value for an octahedral arrangement.
       (ii) Write notes on normal and inverse spinel and Mandelung constant.
17. a) (i) Describe the working principle of a transistor.
       (ii) What are semiconductors? Explain how they are used in the conversion of solar energy to electrical and chemical energies.
                    (OR)
    b) Discuss the band theory and free electron theory of solids.
18. a) Write notes on (i) lattice plane.
                       (ii) Glide plane
                       (iii) Problems with X-ray analysis.
                    (OR)
    b) Give a Comparison of electron, neutron and X-ray diffraction methods.
19. a) How are nanomaterials prepared by the following methods?
       (i) plasma arching   (ii) Sol gel synthesis   (iii) ball-milling
                    (OR)
    b) (i) What are fullerenes? How do they act as superconductors? Highlight their structures.
       (ii) Write notes on nanocomposites.
20. a) Discuss the applications of nanomaterials in various fields.
                    (OR)
    b) Explain the principle, instrumentation and applications of Transmission Electron Microscope.

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