



**Q1.** Choose the correct answer for the following: (13 marks)

- Al, Fe and Ca make up ..... wt% of the earth crust composition.** a-15.76 **b- 16.76** c- 17.67
- The oceanic crust has an average composition that approximates a .....  
**a- low silica igneous rock** b- medium silica igneous rock c- high silica igneous rock
- ..... are examples for minor elements. a- Fe and Ti b- Mg and Ti **c- Mn and Ti**
- Au and Ag are examples for ..... a- Major elements b- Minor elements **c- Trace elements**
- Clay minerals are the common rock-forming minerals.** a- (X) **b- (√)**
- <sup>40</sup>K is radioactive and decays to..... a- <sup>40</sup>Ar and <sup>40</sup>Na **b- <sup>40</sup>Ar and <sup>40</sup>Ca** c- <sup>40</sup>Na and <sup>40</sup>Ca
- The type of atomic radius being measured in metallic structure can be called the .....**  
**a- covalent radius** b- ionic radius c- van der waals raduis
- 12:12 coordination with ABCABC layers of atoms in metals is called .....  
a- Hexagonal close packed **b- Cubic close packed** c- Body center close packed
- In minerals, ..... is present in native metals.**  
a- covalent bonding **b- metallic bonding** c- ionic bonding
- Like a ball, an atom doesn't have a varied radius. **a- (X)** b- (√)
- The arrangement of atoms in a crystal structure depends on the charge of the ion and type of bonding between atoms and the size of the atoms or ions.**

**Q2.** What are the major differences between Diamond and Graphite ? (3 marks)

**Q3.** Discuss that:- Positive ions are smaller but the Negative ions are bigger than the atoms they come from. (2.5 marks)

**Q4.** What are the major properties of substitution type in both *Plagioclase: NaAlSi<sub>3</sub>O<sub>8</sub> - CaAl<sub>2</sub>Si<sub>2</sub>O<sub>8</sub>* and *Olivine (Fe.22Mg.78)<sub>2</sub>SiO<sub>4</sub>* (2.5 marks)

**Q5.** What the following terms are meaning: (4.5 marks)

1. **Trace Element**, 3. **Polymorphism**, 4. **Metastable minerals**

**Q6.** According to Pauling's rule 2, what is your comment on the following diagrams? (4.5 marks)

