

國立臺灣科技大學

八十九學年度碩士班招生考試試題

系所組別： 工程技術研究所在職專班乙組

科 目： 工程材料

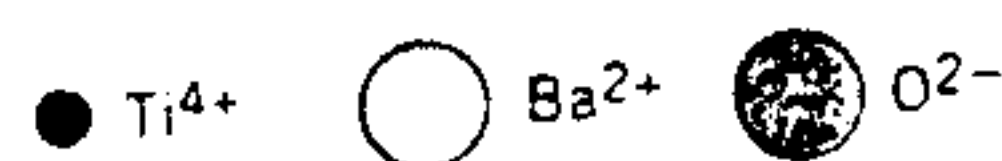
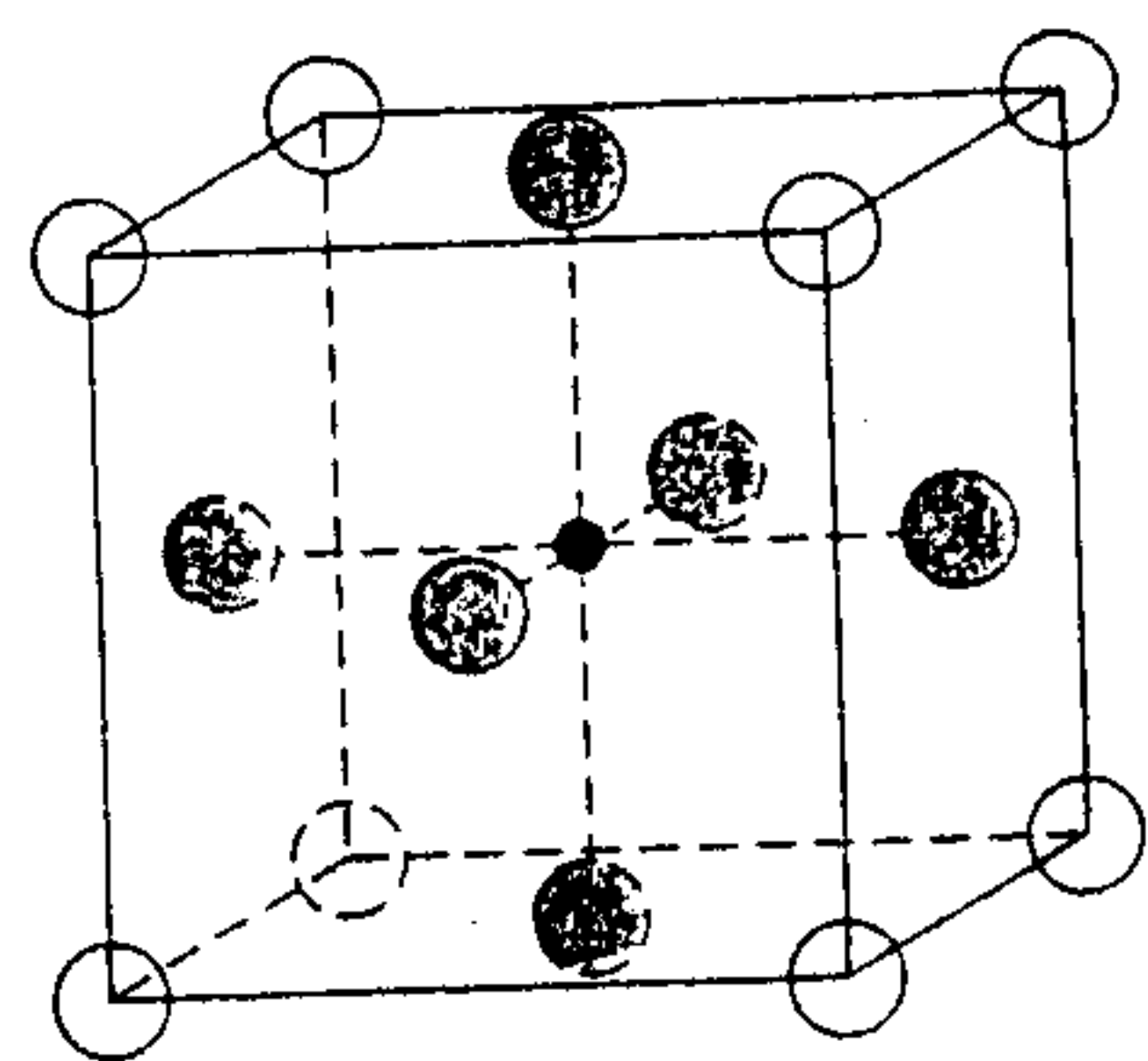
總分 100 分

1、(30%)請對下列文章說明你的見解並歸納出結論。

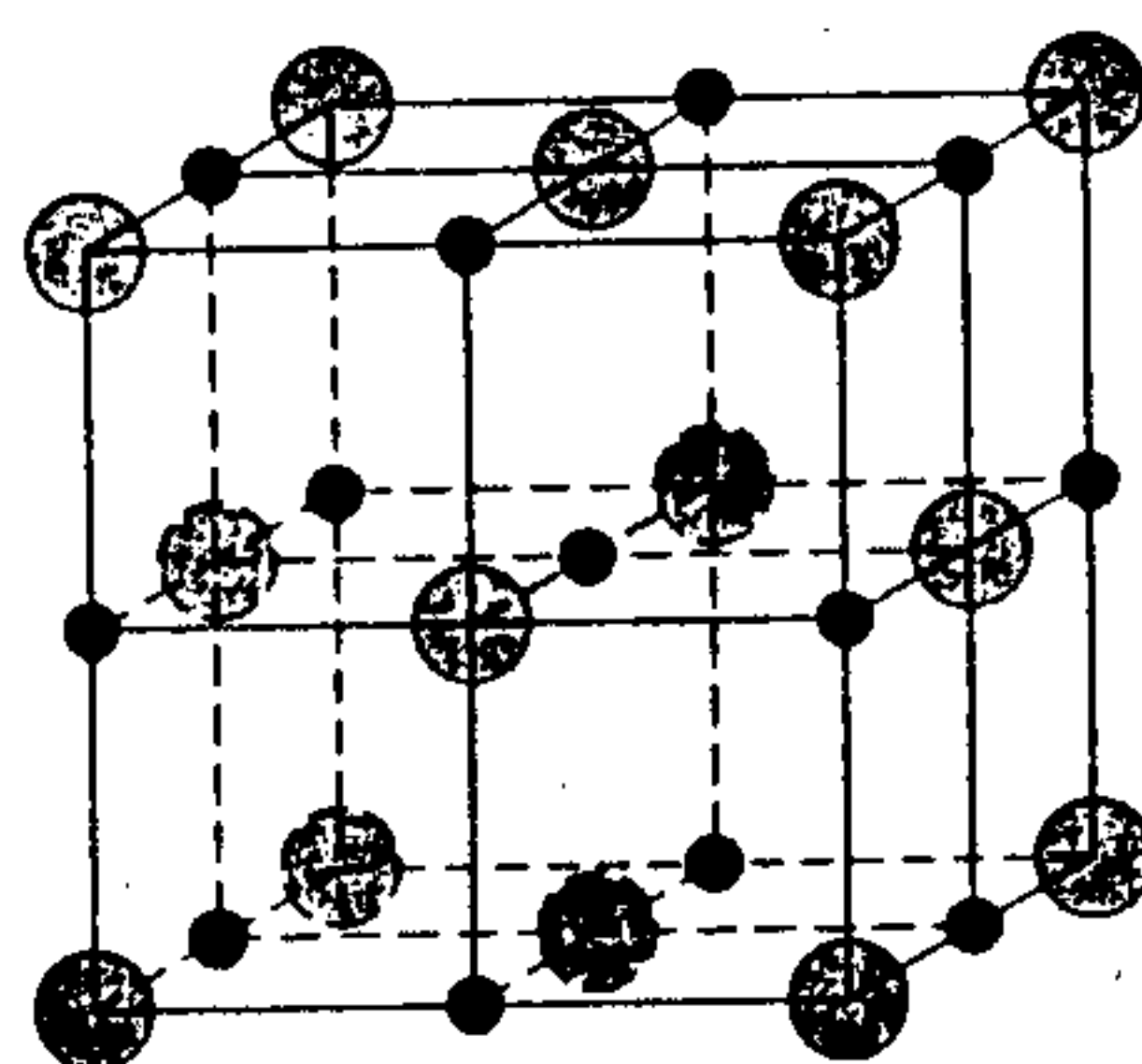
The electronics industry is continually looking for new materials to keep up with its ever changing technologies. Of particular interest is the packaging of integrated circuits (ICs). For some package designs, the ICs are mounted on a substrate material that must be electrically insulating, have appropriate dielectric characteristics (i.e., low dielectric constant), as well as dissipate heat generated by electrical currents that pass through the electronic components (i.e., be thermally conductive). As the IC electronic components become packed closer together, this dissipation of heat becomes an increasingly more critical consideration.

Aluminum oxide has been the standard-bearer substrate material; its chief limitation, however, is a relatively low thermal conductivity. As a general rule, materials that are poor electrical conductors are also poor thermal conductors, and vice versa. Exceptions (i.e., electrical insulators and thermal conductors) are high-purity ceramic materials that have simple crystal structures; these include boron nitride (BN), silicon carbide (SiC), and aluminum nitride (AlN). Currently, the most promising substrate alternative is AlN, which has a thermal conductivity a factor of 10 better than that for alumina. Furthermore, the thermal expansion of AlN is very close to the silicon IC chips for which it serves as a substrate.

2、(20%)請說明模具鋼熱處理後可用那些材料檢驗方法檢測出其殘留沃斯田鐵含量。

3、(25%)圖一為 BaTiO_3 之單位晶胞，請依此說明其壓電特性。4、(25%)圖二為 NaCl 之單位晶胞，請依此說明陶瓷材料之特性。

圖一



圖二

