本試題是否可以使用計算機： ☑可使用 ， □不可使用 （請命題老師勾選）

1. Name and describe 8 different ionic point defects that are found in ceramic compounds (16 points)

2. A list of Mer Structure for 5 of the more common polymeric materials: (10 points)
   A. Polyethylene
   B. Poly(vinyl chloride)
   C. Polypropylene
   D. Polystyrene
   E. Poly(methyl methacrylate)

3. Make a schematic plot showing the tensile engineering stress–strain behavior for a typical metal alloy to the point of fracture and point out the following mechanical properties: elastic modulus, yield stress, tensile stress; also define true stress, true stain, ductility, resilience and toughness (15 points)

4. Which of the following is the slip system for the simple cubic crystal structure? Why? (4 Points)
   $\{100\}<110>$
   $\{110\}<110>$
   $\{100\}<010>$
   $\{110\}<111>$

5. What are solid state sintering and liquid state sintering? What are their procedures, purposes, advantage, disadvantage and application? (15 points)

6. Define the following properties: stress concentration, plane stress & strain, stress intensity factor, fracture toughness, plane strain fracture toughness (15 points)

7. Some prosthetic component is fabricated from a titanium alloy that has a plane strain fracture toughness (K_{IC}) of 50 MPa $\sqrt{}$m. It has been determined that fracture results at a stress of 500 MPa when the maximum (or critical) internal crack length is 4.0 mm. For the same component and alloy, will fracture occur at stress level 450 MPa when the maximum internal crack length is 6 mm? Why and why not? (15 points)

8. Explain the difference between resolved shear stress and critical resolved shear stress. (10 points)