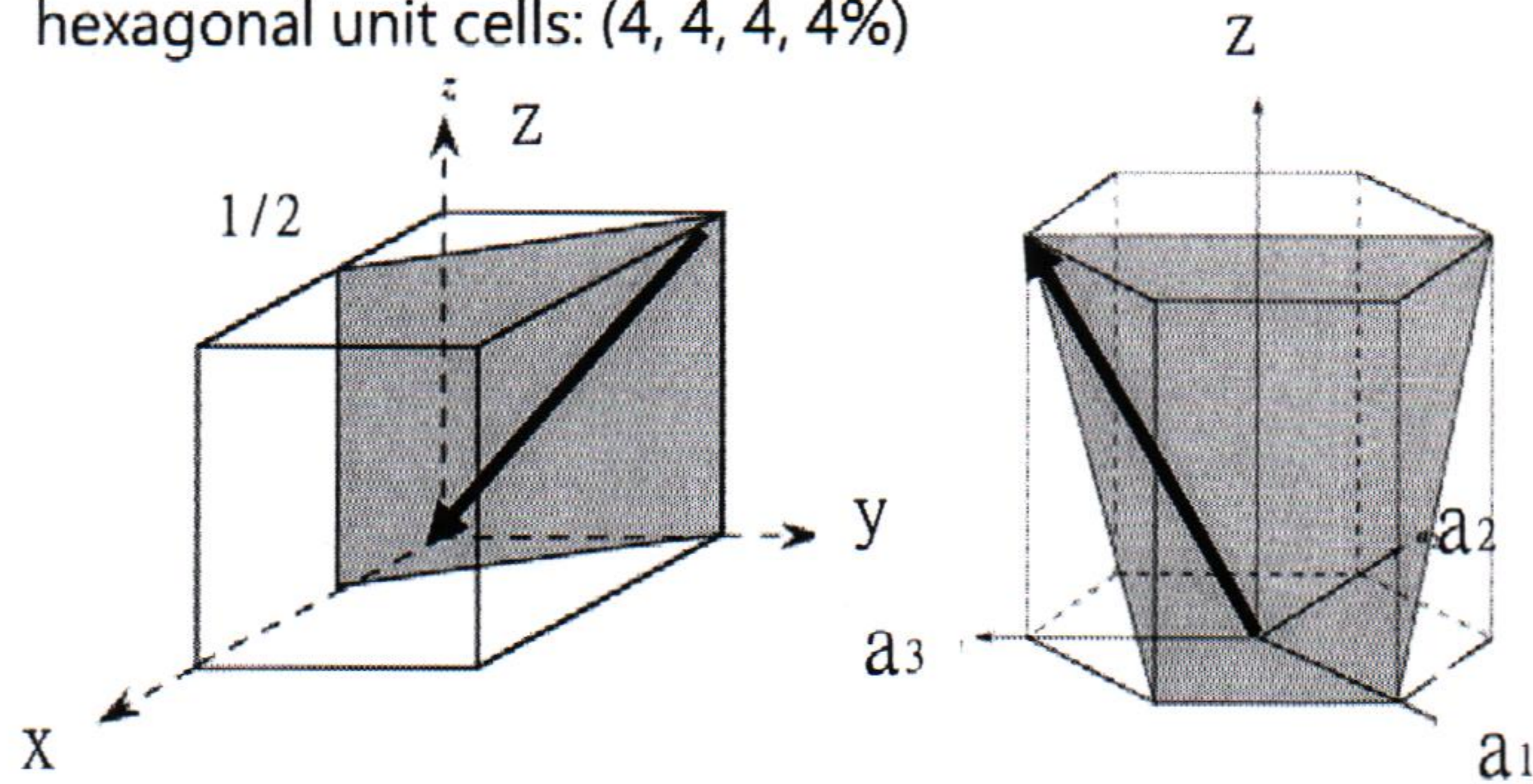


大同大學 101 學年度轉學入學考試試題

考試科目：材料科學導論 所別：材料工程學系 第 1/2 頁

註：本次考試 不可以參考自己的書籍及筆記； 不可以使用字典； 不可以使用計算器。

1. Determine the **Miller indices** for the direction and plane shown in the following cubic unit cell and hexagonal unit cells: (4, 4, 4, 4%)



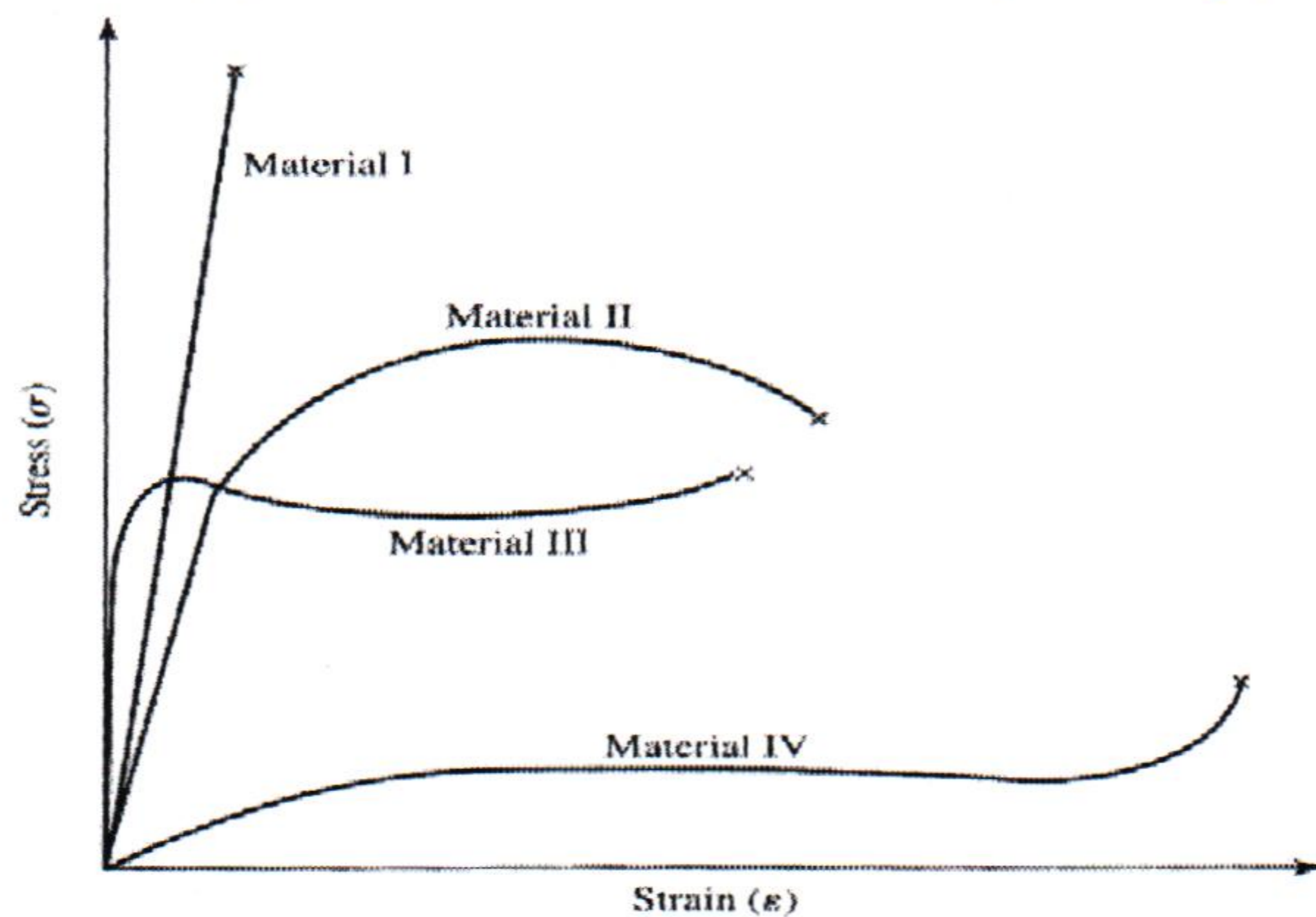
2. Identify the two crystal structure: Body-Centered Cubic (BCC) and Face-Centered Cubic (FCC). (r : radius of sphere and a : length of cube side) (3*8%)

Crystal Structure	Atom/ unit cell	The relation between r and a	Coordination number	Atomic packing factor (APF)
BCC	(1)	(2)	(3)	(4)
FCC	(5)	(6)	(7)	(8)

3. (a) The **Miller indices** for the close-packed planes for hexagonal close-packed (HCP) are _____ (3%)
 (b) The **Miller indices** for the close-packed planes for face-centered cubic (FCC) are _____ (3%)

4. Consider the following test specimens that were subjected to tensile testing. (2*8%)

Match (a) each **material** to the corresponding (配合) stress-strain curve and (b) the **type** of deformation.



	(a) <u>Metal</u> or <u>Ceramic</u> or <u>Polymer</u>	(b) <u>Elastic</u> or <u>Plastic</u> deformation
Material I		
Material II		
Material III		
Material IV		

5. Briefly explain why fine pearlite is harder and stronger than coarse pearlite, which in turn is harder and stronger than spheroidite. (5%)

6. Cite two reasons why martensite is so hard and brittle. (6%)

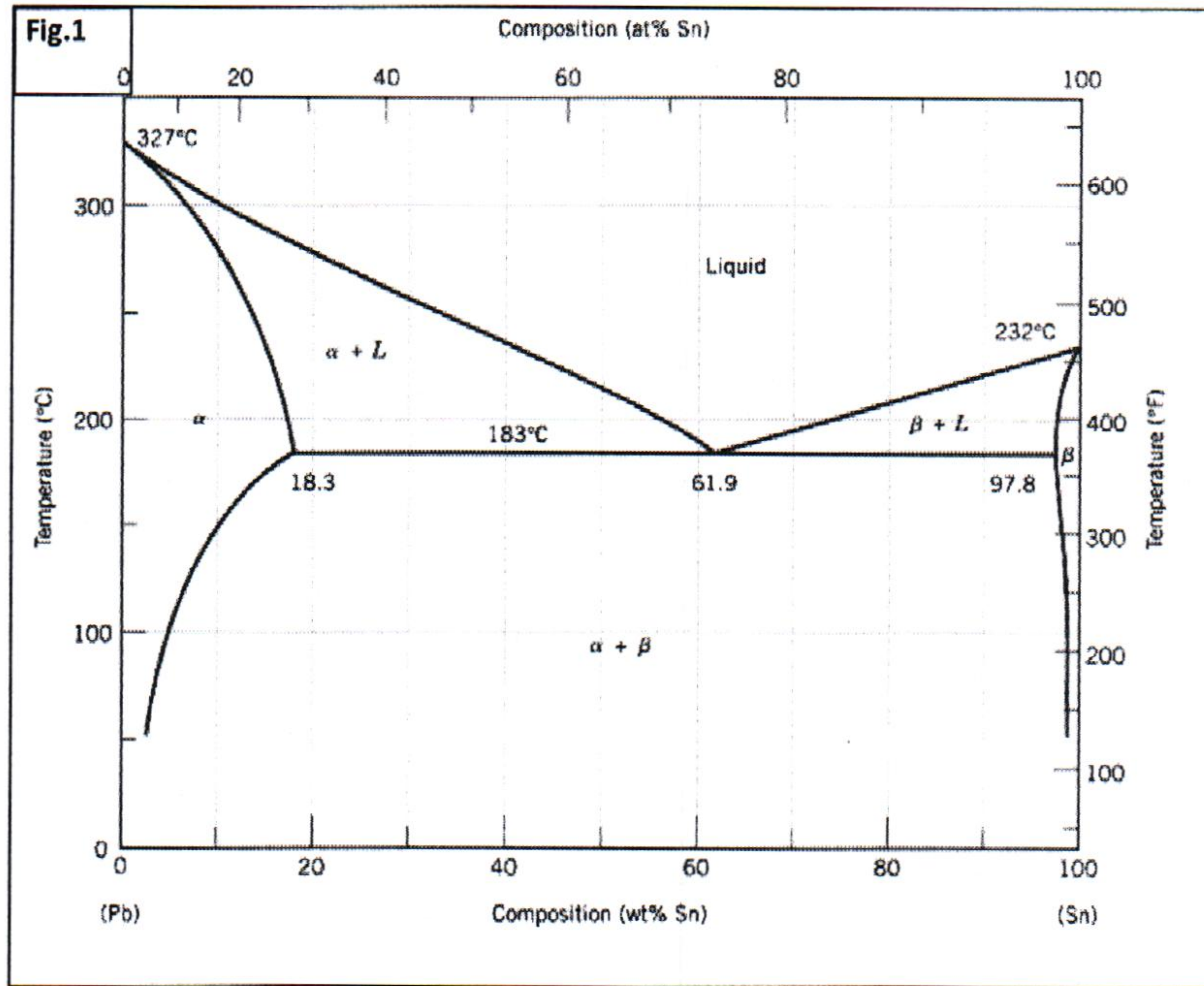
〈背面繼續〉

大同大學 101 學年度轉學入學考試試題

考試科目：材料科學導論 所別：材料工程學系 第 $\frac{1}{2}$ 頁

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7. For a 40 wt% Sn– 60 wt% Pb alloy (Fig.1) at 150°C(300°F).
- What phase(s) is (are) present?(4%)
 - What is (are) the composition(s) of the phase(s)?(8%)
 - Calculate the relative amount of each phase present in terms of mass fraction and volume fraction.(10%)
- (The densities of Pb:11.23 and Sn:7.24 g/cm³, respectively.)



8. Consider the following test specimens that were subjected to tensile testing. Label each series with the type of deformation that occurs and justify your answer.
- Match (配對) each series to the corresponding stress-strain curve. (3%)
 - For which series is the mechanical deformation subject to Hooke's Law throughout the testing illustrated? (2%)

