編號： 99

國立成功大學 108 學年度碩士班招生考試試題

系　　所：土木工程學系

考試科目：工程材料學

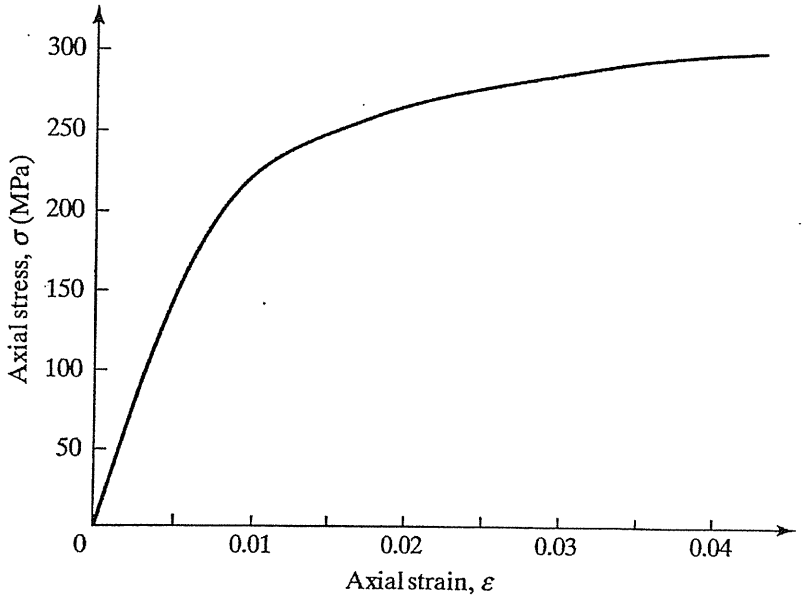
考試日期：0223，節次：2

※ 考生請注意：本試題可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. The following figure shows the tensile stress-strain diagram for a metal bar.

   (a) Determine the Young's modulus, and the yield stress by 0.2% proof stress. (10%)

   (b) What is the plastic strain when the longitudinal strain is 3%? (10%)



2. A sieve analysis test was conducted on a representative sample of an aggregate material, and the results are given below.

Sieve size (mm)	12.5	9.5	4.75	2.36	1.18	0.60	0.425	0.3	0.15	0.075	pan
Amount retained (g)	0	38.7	36.8	77.5	127.8	164.6	174.3	141.4	105.6	67.8	33.9

   (a) Calculate the percent passing through each sieve and plot the grading curve of the aggregate. (10%)

   (b) Calculate the Fineness Modulus. (10%)

3. For samples of fine and coarse aggregate from the supplied source,

Material	Weight of wet sample+tray (g)	Weight of dry sample+tray (g)	Weight of the tray (g)
Fine aggregate	1040	1005	208
Coarse aggregate	1533	1516	206

   (a) Determine the moisture content in the given fine and coarse aggregates. (10%)

   (b) Assume that the saturated surface dry moisture conditions for fine and coarse aggregate are 1% and 2%, respectively. Determine the total free-water in the concrete mix, if 220kg of fine aggregate and 425kg of coarse aggregate from the given source were to be used. (10%)

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4.

(a) Explain the difference between hypoeutectoid and hypereutectoid steels? (10%)

(b) Explain the ductile-to-brittle transition (10%)

(c) Describe the dynamic shear rheometer test (10%)

(d) Gold has an atomic radius of 0.1442 nm and a density of 19.3 g/cm^3. Determine whether it has a BCC or FCC crystal structure (10%)