

Name of the Student _____

HOMEWORK 2**Question 1**

Discuss the effect of the following factors upon the modulus of elasticity: age, water-cement ratio, aggregate content, free moisture and strength.

Question 2 (from MT 97)

Estimate the elastic modulus of cement paste with no porosity. Use the series and parallel models.

Porosity	E (Pa)
0.28	2.9e+10
0.34	2.7e+10
0.38	2.3e+10

Question 3

A 5000 psi concrete is made with limestone aggregate. Suppose you replace 50% of the aggregate with solid steel balls (about the same size as the aggregates). Is the compressive strength going to increase? What about the elastic modulus? Please justify your answer.

Question 4

Draw a typical stress-strain curve for concrete. From this, how would you determine the dynamic modulus of elasticity and the different types of the static elastic moduli?

Question 5

Enter a check before the correct statement and enter an (x) before those which are not correct, either wholly or in part.

- ___ Bond strength is less for horizontal reinforcing bars than for vertical bars.
- ___ The rate of strength development of concrete depends on the moisture conditions during curing, but is independent of the temperature history of the curing period.
- ___ In a compressive test of concrete, the faster the rate of loading, the lower the indicated strength.
- ___ The greater the ratio of specimen height to diameter (h/d), the lower the strength indicated by the compression test.
- ___ Tensile strength of concrete is about 10% of the compressive strength.

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Question 6

Duff Abrams established a "law" relating water-to-cement ratio with concrete strength. List two additional factors which have a significant influence on strength of concrete.

Question 7

Many factors have an influence on the compressive strength of concrete. Briefly explain which one of the two options listed below will result in higher strength at 28 days:

- (a) Water-cement ratio of 0.5 vs 0.4.
- (b) Moist curing temperature of 25°C vs 10°C .
- (c) Using test cylinder of size 150 by 300 mm vs 75 by 150 mm.
- (d) Using a compression test loading rate of 3 MPa/sec vs 0.3 MPa/sec.
- (e) Testing the specimens in a saturated condition vs air-dry condition.