

UNIVERSITY OF CALIFORNIA AT BERKELEY  
SPRING SEMESTER, 2006

CEE  
Instructor: P.J. M. Monteiro

Name: \_\_\_\_\_

### **CE 165 - EXAMINATION**

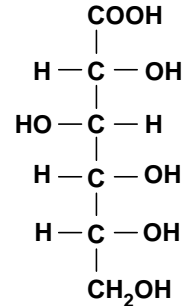
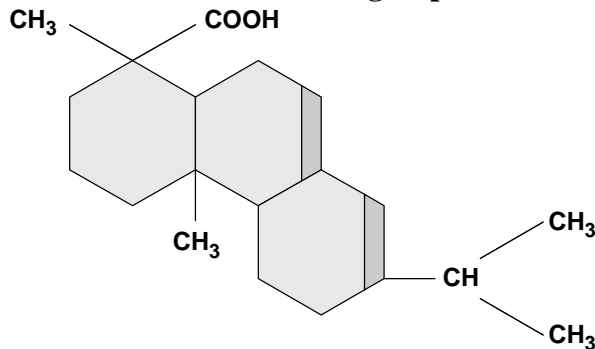
*Please justify your answer in all the questions*

#### **Question 1(20 points)**

- I) Briefly describe the compound composition of the following hydraulic cements, and list the type of construction jobs for which you would use them: (i) ASTM Type III cement, (ii) ASTM Type V cement (8 points)**
- II) Give two characteristics of the aggregate that have a substantial influence on workability? (6 points)**
- III) Can you describe a quick laboratory test to measure the workability of concrete? (6points)**

**Question 2 (20 points)**

**I) Just by inspection of the following formulas identify if the surfactants will act as air-entraining or plasticizer (8 points)**



**II) An Canadian engineer wants to develop high strength concrete containing a large amount of air-voids. Do you see a potential compatibility problem of using air-entraining agents and superplasticizers? (6 points)**

**III) Explain the difference between false and fast set ( 6 points)**

**Question 3 (20 points)**

- I) Why are clays and shales usually calcined (heat treated) to make them more suitable for use as a pozzolan? (6 points)**
- II) Give two major advantages of using 7% of silica fume and 25% of fly ash in a concrete mixture. (8 points)**
- III) For the concrete mixture describe above, explain what should be the major concern when it is in a fresh state (6 points)**

**Question 4 (20 points)**

**I) Explain the major differences between fly ash type C and F (7 points)**

**II) Water-reducing admixtures can lower the cement content and increase the consistency and strength of a reference concrete mixture. Explain why all three benefits may not be available at the same time (6 points)**

**III) Explain why sand should not be proportioned by volume in a concrete mixture? (7 points)**

**Question 5 (20 points)**

- I) Briefly state why, when compared to crushed concrete from a pavement, a demolished building may not be as suitable for use as aggregate for new concrete (6 points)**
- II) What is plastic shrinkage cracking and when does it occur in concrete construction? (7 points)**
- III) For a slab on-grade exposed to direct sun, what precautions would you recommend to avoid problems with the slab? (7 points)**