

**COT 6315/CIS 4930 (Spring03,Sitharam)**

**Sample Test 1(2 hrs–closed book):** Note this is only a rough guide. The overall structure of the test is as follows; i.e, 1 classification question with 6 items to be classified as regular or nonregular. Individual items need not follow pattern of those given below. You need to work on the HW and other exercises in book – the items can follow the spirit of any of them.

–Please write your name and code legibly on top of your answer sheet.

–**Answer all questions.** Please budget your time so that you spend no more than an average of 17 min on each (sub)question.

1. Classify the following languages as regular, or not regular and give a full justification (proof, if required) of your classification.
  - (a) The set EQUAL of strings in a 2 letter alphabet, in which the numbers of a's and b's are equal.
  - (b) The set WEIRD of strings of 0's and 1's which have: an even number of 0's, a number of 1's that is not a multiple of 5, and end with an odd number of 0's (atleast 3). So, for example 0110110000 is not in the language, but 0011011000 is; 0000, 00100 and 0101010101000 are not in the language but 0100000 is.
  - (c) Let  $L$  be regular. Classify the language  $\text{VERYDIFFERENT}(L) = \{z : \forall x, u, v \in \Sigma^* (xuv = z) \Rightarrow (u \notin L)\}$  I.e,  $\text{VERYDIFFERENT}(L)$  is the set of all strings of which no substring belongs in  $L$ .
  - (d) The set  $\text{BALANCED} = \{a^k b^l c^m d^n : n + k = m + l\}$ .
  - (e) two more classification questions like this.