VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

School of Computer Science & Engineering

Continuous Assessment Test –I

A2+TA2+TAA2-Slot CAT-I (Aug-2018)

CSE2002-Theory of Computation and Compiler Design

Time: 1:30 Hrs **Max.Marks:50**

Answers ALL the questions

1. Prove or disprove the following:

   a) Let $L = \{ w \in \{0, 1\}^* / w \text{ contains at least three 1's} \}$ and let $L' = \{0, 1\}^* 1 \{0, 1\}^* 1 \{0, 1\}^* 1 \{0, 1\}^*$, $L = L'$ [4]

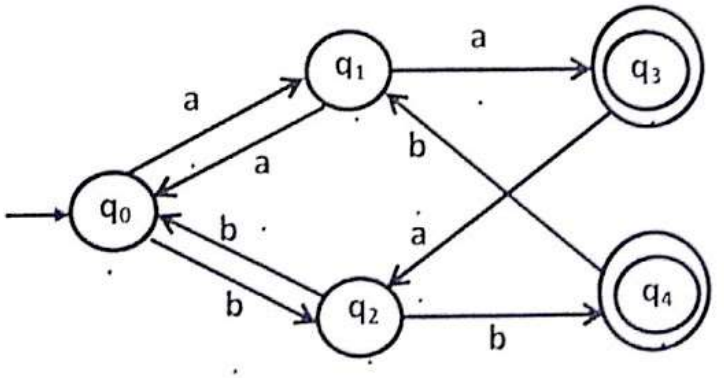
   b) Let $L = \{a^n b^n / n \geq 0\}$. Then the complement of L is L^c and $L^c = \{a^n b^m / m, n \geq 1, m \neq n\}$ [4]

   c) The regular expressions $P = (1*0 + 001)* 01$ and $Q = (1*001 + 00101)*$ are equivalent [4]

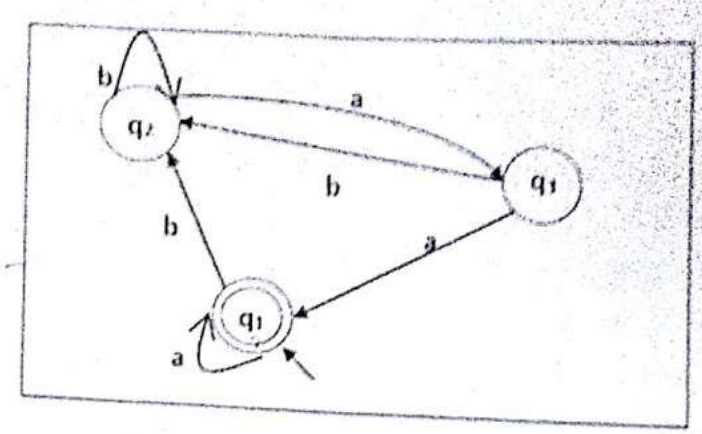
   d) Every subset of a regular set is regular. [4]

   e) Regular expression corresponding to the complement of the regular expression $(a + ab)^*$ is $(aa*b)* b (a+b)*$ [4]

2. a) Construct DFA for the NFA given below: [5]



b) Using Arden's Theorem,construct a regular expression to the automata given below [5]



3. a) State pumping lemma for regular languages and show that $L = \{a^{n^2} / \ n \geq 1\}$ is not regular. [4]

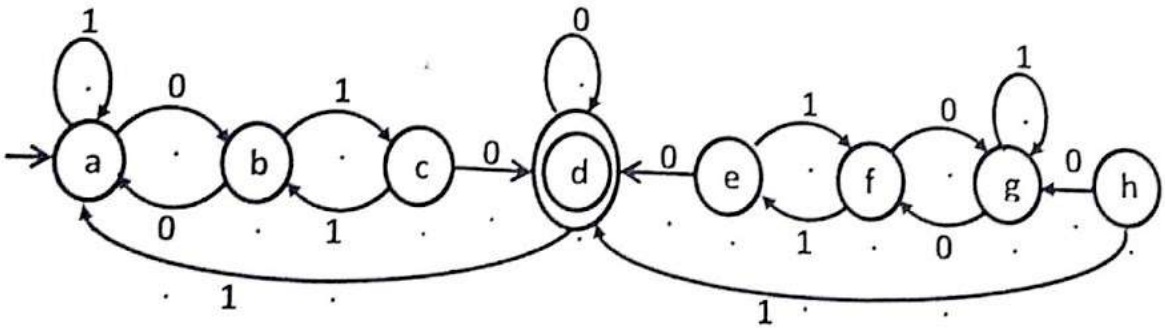
b) Construct a DFA over $\Sigma = \{a, b\}$ for accepting strings which satisfy the following conditions:

If the string begins with **a** it is of even length (≥ 2). If the string begins with **b** it is of odd length (≥ 3).

[4]

4. a) Show the translation for an assignment statement: position:= initial + rate * 60. Clearly indicate the output of each phase of the compiler. [4]

b) When do you say two states are equivalent in DFA? When are they distinguishable? What do you mean by a distinguishable sequence? Consider the DFA in the following figure. **a** is the initial state and **d** is the final state. [8]



Which states are equivalent? Which states are distinguishable? Find the minimum state automaton.

xxxxxxxEndxxxxxxx