**Institute of Technology and Science Pilani**

**Birla 1st Sem 2012-13 CS C351 Theory of computation**

**Take Home Evaluated Tutorial 4 Max Marks 4**

**Date of Posting 3rd Sep**

**Date of Submission 4th Sep**

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**Submit a handwritten solution on A4 paper. At the top left hand corner, write your ID and name. On the top right corner write your section number and instructor’s name. Submit to your instructor during the tutorial *only.* At the top of the sheet please write the statement ‘*I have worked out this tutorial with my own effort’* and sign underneath. Write only those answers for which marks are indicated, with the correct question number.**

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**Q1. Let Σ = {a,b,c}. Construct a DFA that accepts 1M=0.5+0.25+0.25**

1. **Σ\***
2. **A DFA which accepts Σ\*, but with at least one state more than you have used in (a)**
3. **Φ**
4. **Φ\***

**Q2. (a) Construct (directly, using a suitable strategy) a DFA that accepts strings over {a,b} that contain the substring aaabaab. If there are k states in this DFA, name them p1,p2,p3,…pk. Let p1 be the start state. Use this scheme in Q3. 1M**

**(b) Now construct (directly), an NFA for the same language. 0.25M**

**(c) Modify the DFA of (a) when the alphabet is {a,b,c} 0.25M**

**Q3. Refer to the theorem 2.4.1 of the textbook. Consider the DFA of Q2(a) wrt to this theorem. Consider two input strings u = baabaaabaabb and v = aaaaabaabaa, both of which belong to the language accepted by the DFA and are longer than k.**

**(a)For each string, give the sequence of configurations that lead to acceptance, on your DFA. (q0,baabaaabaabb) →(q2,aabaaabaabb)→\*……(q12,e), for the first string, with q0 being p1.**

**0.25+0.25M**

**(b)For each string, (let u = u1u2u3…ui….uj….u12, for instance) point out the substring (uiui+1…uj for u) which drives the DFA from some state qi back to the same state (qj = qi). 0.5+0.5M**

**(c) These strings (of (b) above) are the ‘y’ of the theorem. Convince yourself that y occurs within the first k symbols of the string (u or v). Convince yourself that y is not the empty string.**