CSIS Dept; BPHC; 1st Semester 2020-21

Theory of Computation (CSF351)

Test-1 19-09-2020; Time 30 Mins. Max marks: 30 Wt:15%

1. Can a Finite automaton recognize a *palindrome*? Give explanation for your answer. [2marks]

2. The string ***1101*** does not belong to the sets represented by which of the following REs-

   A. 110*(01) (0U1)*
   B. 1(0U1)*101(11)*
   C. ((00)U(11)*0)*
   D. (10)*(01)* ((00)U(11))*

Note: More than one option may be correct. Must tick all correct options for full marks. [3 marks]

3. The RE: *0*(10*)** denotes the same set as - [3 marks]
   A. (1*0)*1*
   B. 0U(0U10)*
   C. (0U1)*10(0U1)*
   D. None of the above

More than one option may be correct. Must tick all correct options for full marks.

4. Given the Language ***L***={ab, aa, baa} which of the following strings are in ***L**** ? [3 marks]

   A. abaabaaabaa
   B. aaaabaaaaba
   C. baaaaabaaaab
   D. baaaaabaaaa

5. Give a Finite Automaton to accept a language L containing strings over an alphabet {a,b}, such that no string will containing more than one occurrence of substring ‘aa’.
   Sample valid strings: {e, a, ab, b, bb, aa, aab, abaa, bbbaab, baa, etc.}
   Sample invalid strings: { aaa, aaaa, abaabaa, aabaa, bbbaaaa, bbaaa etc}
   Specify start sate, final states, etc.

No need to give diagram or table. A transition from a state q0 to state q1 on symbol 'a' can be represented as (q0,a,q1) or (qo,a)→q1 both or ok.
Specify the start state and set of final states.
Hence give set of transitions, start state and final states for the Finite Automaton. [9 marks]

6. Give a Finite transducer which takes strings over {a,b} as input and output a string where every third ***b*** is converted to ***a*** and leaving the remaining portion unchanged. [5 marks]
   Ex: Input : *abaababb* output: *abaabaab*
   Input: *abbba* output : *abbaa*
   Input: *abbbabbab* output : *abbaabbaa*
   Represent transitions as below.
   Ex: if from state q0 on symbol ***a*** goto ***q1*** and output ***b*** , can be given as- (q0, a, q1, b) give other important detail as appropriate.

7. Give a Finite automaton with number of states less than or equal to 3, to accept the language represented by Regular expression – ***(ab U aa)****
   Sample valid strings: {e, aa, ab, abab, abaa, ababab, abaaab etc.}
   No need to give diagram or table. A transition from a state q0 to state q1 on symbol '***a***' can be represented as (q0,a,q1) or (q0,a)→q1 both or ok.
   Specify the start state and set of final states.
   Hence give set of transitions, start state and final states for the Finite Automaton. [5 marks]