Tutorial-10(18-11-2020)

1. Let Nf and Np denote the classes of languages accepted by non-deterministic finite automata and non-deterministic push-down automata, respectively. Let Df and Dp denote the classes of languages accepted by deterministic finite automata and deterministic push-down automata, respectively. Which one of the following is TRUE?
   a. Df ⊂ Nf and Dp ⊂ Np
   b. Df ⊂ Nf and Dp = Np
   c. Df = Nf and Dp = Np
   d. Df = Nf and Dp ⊂ Np

2. The regular expression 0*(10*)* denotes the same set as
   a. (1*0)*1*
   b. 0 + (0 + 10)*
   c. (0 + 1)* 10(0 + 1)*
   d. none of these

3. What is a : (a) String (b) Regular language

4. What is Arden's Theorem?

5. Prove that " A language L is regular iff it has a regular grammar."

6. Prove that if L1 and L2 are CFLs, then L1.L2 is also CFL.

7. Let S and T be language over ={a,b} represented by the regular expressions (a+b*)* and (a+b)*, respectively. Which of the following is true?
   a. ScT (S is a subset of T)
   b. TcS (T is a subset of S)
   c. S=T
   d. SnT=Ø

8. Let L denotes the language generated by the grammar S – OSO/00. Which of the following is true?

    a. L = O

    b. L is regular but not O

    c. L is context free but not regular

    d. L is not context free

9. A FSM (Finite State Machine) can be designed to add two integers of any arbitrary length (arbitrary number of digits). True or False, justify your answer.

10. Which two of the following four regular expressions are equivalent? (ε is the empty string).

    a. (i) $(00)^*$ $(\varepsilon + 0)$

    b. $(00)^*$

    c. 0^*

    d. $0(00)^*$

(i) (a) and (b)

(ii) (b) and (c)

(iii) (a) and (c)

(iv) (c) and (d)

Questions to be solved latest by Saturday (21/11/2020)

1. Prove that "A CFL's are not closed under complementations."
2. Prove that "If L is a CFL and R is a regular language, then LUR is a CFL."
3. Write down the Regular expression for:
   a. All strings over {0,1} with the substring '0101'
   b. All strings beginning with '11 ' and ending with 'ab'
   c. Set of all strings over {a,b}with 3 consecutive b's.
   d. Set of all strings that end with '1'and has no substring '00'
4. How many substrings (of all length inclusive) can be formed from a character string of length n? Assume all characters to be distinct. Prove your answer

NOTE: *Upload your solutions only through the given link. Name your pdf file with the format **<rollno_name_tutorialno>**. Do not mail your solutions elsewhere.*

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