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|  | **Assignment No. 01 Semester: Fall 2019 Theory of Automata – CS402** | **Total Marks: 20**  **Due Date: November 1**5**, 2019** |
| **Objectives:**  **Objective of this assignment is to assess the understanding of students about the concept of languages, regular expressions and finite automata.**  **Instructions:**  **Please read the following instructions carefully before submitting assignment:**   * You should consult the recommended books, PowerPoint slides and audio lectures to clarify your concepts. * You are supposed to submit your assignment in **.doc format.** Any other formats like scan images, PDF, zip, rar and bmp etc will not be accepted. * It should be clear that your assignment will not get any credit if: * The assignment is submitted after due date. * The assignment is copied from Internet or from any other student. * The submitted assignment does not open or file is corrupt.   **Note:** No assignment will be accepted after the due date through email in any case (load shedding, server down, internet malfunctioning etc.).  It is recommended to upload solution file at least two days before its closing date.  For any query about the assignment, contact at [**CS402@vu.edu.pk**](mailto:CS402@vu.edu.pk)  **Question: Marks = 20**  Q1. Show that the following pairs of regular expressions define the same language over the alphabet  **L** = {a, *b}.*  **(i) (ab)\*a and a(ba)\***  **(ii) (a\* + b)\* and (a + b)\***  **(iii) (a\* + b\*)\* and (a + b)\***   * Since the strings generated by language (ab)\*a and a(ba)\* define the same strings ending in a hence both  RE define the same language. * Both RE define the same language of all string containing any number of a’s and b’s * Since (a\* + b\*)\*  and (a + b)\* generate all string containing any number of a’s and b’s hence both RE define the same  language.   **[9 marks = 3\*3]**  Q2. Develop a regular expression for the following language over the alphabet P = {a, b} such that it accepts all strings in which the letter b is never tripled. This means that no word contains the substring bbb. **[5 marks]**  (Λ + b + bb)(a + ab + abb)\*  Sincewe need to define RE for a language that have strings like {Λ, abb,abba, aabbaa,…}  Hence the RE for this language would be (a \* +  bb)\*  Q3. Develop a regular expression for the following language over the alphabet P = {a, b} such that it accepts all strings all words in which a is tripled or b is tripled, but not both. This means each word contains the substring aaa or the substring bbb but not both. **[ 6 marks]**  ((Λ + b + bb)(a + ab + abb)\*aaa(Λ + b + bb)(a + ab + abb)\*)+ ((Λ + a + aa)(b + ba + baa)\*bbb(Λ + a + aa)(b + ba + baa)\*)  Since we need to develop a RE for a language that have strings like {aaab, bbbaa, aaabb}  Hence the required RE for this language would be (aaa+ + b) + (bbb+ + a) | | |
| **BEST OF LUCK** | | |

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