**SRM Institute of Science and Technology**

**College of Engineering and Technology**

**School of Computing**

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

**Academic Year: 2022-23 (ODD)**

**B.Tech-Computer Science & Engineering**

**Test: CLA-T1** **Date: 14.09.2022**

**Course Code & Title: 18CSC301T & Formal Languages and Automata Theory**  **Duration: 1 period**

**Year & Sem: III Year /V Sem** **Max. Marks: 25**

***SET-D***

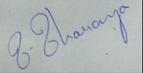
**Course articulation matrix:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **PLO** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| **CO 1** | **M** | **H** | **-** | **M** | **L** | **-** | **-** | **-** | **L** | **L** | **-** | **H** | **-** | **-** | **-** |
| **CO2** | **M** | **H** | **L** | **M** | **L** | **-** | **-** | **-** | **M** | **L** | **-** | **H** | **-** | **-** | **-** |
| **CO3** | **M** | **H** | **M** | **H** | **L** | **-** | **-** | **-** | **M** | **L** | **-** | **H** | **-** | **-** | **-** |
| **CO4** | **M** | **H** | **M** | **H** | **L** | **-** | **-** | **-** | **M** | **L** | **-** | **H** | **-** | **-** | **-** |
| **CO5** | **H** | **H** | **M** | **H** | **L** | **-** | **-** | **-** | **M** | **L** | **-** | **H** | **-** | **-** | **-** |
| **CO6** | **L** | **H** | **-** | **H** | **L** | **-** | **-** | **-** | **L** | **L** | **-** | **H** | **-** | **-** | **-** |

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| **Part - A**  **Instructions: Answer all** | | | | | | |
| **Q. No** | **Question** | **Marks** | **BL** | **CO** | **PO** | **PI Code** |
| 1 | “ If it rains, then the weather will be cool”. Which of the following is true?   1. Hypothesis is followed by conclusion 2. Conclusion follows hypothesis 3. Conclusion cannot be deduced from hypothesis 4. Hypothesis is deduced from conclusion | **1** | 2 | 1 | 1 | **1.6.1** |
| 2 | “ English is a language that is formed from 26 alphabets”. Which operation enables the formation of words in English?   1. Union b) Closure   c) Concatenation d) Substring | 1 | 2 | 1 | **1** | **1.6.1** |
| 3 | What is the minimum number of states required by the DFA that accepts the language? L={a | a is a number divisible by n} ?   1. n-1 b) n c) n+1 d) 2^n | 1 | 3 | 2 | 2 | **2.6.2** |
| 4 | Give the regular expression that generate strings with "101" as substring over the input Σ={0,1}   1. (0+1)\*101 (0+1)\*       b) (0+1)\*101   c) 101 (0+1)\*    d) (101)\* | 1 | 4 | 2 | 2 | **2.6.2** |
| 5 | Which of the following is false?   1. DFA cannot move to same state for two different inputs 2. DFA can move to same state for two different inputs 3. DFA can move to two different states for different inputs 4. DFA cannot contain transitions for null symbol | 1 | 2 | 2 | 1 | **1.6.1** |
| 6 | Which of the following is the transition function of ε-NFA?   1. Q x (Σ U ε) 🡪 2^Q b) Q x (Σ U ε) 🡪 Q   c) Q x Σ 🡪 2^Q d) Q x Σ 🡪 Q | 1 | 1 | 2 | 1 | **1.5.1** |
| 7 | Consider R1=0\*(10\*)\*. The equivalent of R1 is   1. (1\*0)\*1\* b) 0+(0+10)\*   c) (0+1)\*10(0+1)\* d) No equivalent expression | 1 | 4 | 2 | 2 | **2.7.1** |
| 8 | The following FSA recognizes   |  |  | | --- | --- | |  |  | | 1 | 4 | 2 | 2 | **2.6.3** |
| 9 | Two FSAs can be said equivalent if   1. They have equal number of edges 2. They have equal number of states 3. They accept same language 4. They have equal number of states and edges | 1 | 2 | 2 | 2 | **2.6.2** |
| 10 | What is the hierarchy of ε-NFA, DFA and NFA in increasing order of flexibility?   1. ε-NFA, NFA, DFA b) NFA, ε-NFA, DFA   c) DFA, NFA, ε-NFA d) DFA, ε-NFA-NFA | 1 | 2 | 2 | 2 | **2.6.3** |
| **Part-B (1 x 5=5 marks)** | | | | | | |
| 11 | A company has to assign employee IDs to its workers. The employees in managerial cadre will be assigned IDs starting with “MA” while the other workers will be assigned with IDs staring with “WR”. The remaining part of their IDs should contain even number of a’s and b’s. Create a DFA to this. | 5 | 5 | 2 | 6 | **6.3.1** |
| **Part-C (1 x 10=10 marks)** | | | | | | |
| 12 | Investigate whether the given DFA’s are equivalent using Myhill Nerode theorem:   |  |  | | --- | --- | |  |  | | 10 | 6 | 2 | 4 | **4.3.1** |

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**Approved by ~~Audit Professor~~/ Course Coordinator**