 **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-T2** **Date: 19.10.2022**

**Course Code & Title: 18CSC301T & Formal Languages and Automata Theory**  **Duration: 2 period**s

**Year & Sem: III Year /V Sem** **Max. Marks: 50**

***Set -B***

**Course articulation matrix:**

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|  | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PO 11** | **PO 12** | **PSO 1** | **PSO 2** | **PSO 3** |
| **CO-1** | 3 |  |  |  |  |  |  |  |  |  |  |  |  |  | 3 |
| **CO-2** |  | 3 | 2 |  |  |  |  |  |  |  |  |  |  |  | 3 |
| **CO-3** |  | 3 | 3 |  |  |  |  |  |  |  |  |  |  |  | 3 |
| **CO-4** |  | 3 | 3 |  |  |  |  |  |  |  |  |  |  |  | 3 |
| **CO-5** |  |  | 3 | 1 |  |  |  |  |  |  |  |  | 2 |  | 3 |

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| **Part - A**  **Instructions: Answer any two questions** | | | | | | |
| **Q. No** | **Question** | **Marks** | **BL** | **CO** | **PO** | **PI Code** |
| 1 | Consider the following grammar  S🡪 NP VP  NP🡪DT N| NP PP  PP🡪PRP NP  VP🡪V NP| VP PP  DT🡪a| the  N🡪lion| deer| tree  PRP🡪under |with |above  V🡪ate| saw| ran   1. Which of the following is not true about PDA? (1 Mark) 2. PDA can be either deterministic or non-deterministic 3. The stack in the PDA can have only stack symbols 4. The stack in the PDA can contain stack symbols and input symbols 5. For every CFG, there exists an equivalent PDA. 6. How many left recursive productions are there in the above grammar? (1 Mark) 7. 1 b) 2 c) no left recursive production d) 3 8. Convert the above CFG into PDA. (5 Marks) 9. List the terminals and non-terminals in the given grammar (3 Marks) 10. Can you derive the sentence “ A lion ate the deer under the tree” using parse tree (3 Marks) 11. Simplify the grammar (8 Marks) 12. Convert the above CFG to Chomsky Normal Form (CNF) (4 Marks) | 25 | 3 | 2,3 | 4 | **4.2.1** |
| 2 | Abinav has to travel back to his home every day from college. He can use two paths, path A and path B. Each month if he takes path A once he needs to take path B twice that month. In each given duration he needs to take path A first for n number of days sequentially followed by taking up path B as per the given condition.   1. Which of the following is true about CFG? (1 Mark) 2. The number of symbols in LHS of CFG must always be less than or equal to the number of symbols in RHS 3. The RHS of the CFG cannot start with terminals 4. The RHS of the CFG cannot start with nonterminals 5. CFG cannot have epsilon in its RHS 6. I: Context sensitive grammar is a subset of Context Free Grammar (1 Mark)   II: Regular grammars are the most restricted type of grammars   1. Both are false 2. Both are true 3. I is false and II is true 4. II is false and I is true 5. Construct Context Free Grammar (5 Marks) 6. Simplify the CFG (8 Marks) 7. Convert the CFG into GNF (10 Marks) | 25 | 4 | 2 | 4 | **4.2.1** |
| 3 | The college organized a Teacher’s day celebration event for all its employees. The employees participated in various games of the events. One such game is picking the color flowers from the pool. The employee has to pick the flowers in the order specified. The one who is picking all the flowers in the specified order at the earliest is the winner. The colored flowers are Red, Green, violet and yellow.  **Case (i):**  First, they should pick ‘m’ number of red flowers then ‘n’ number of green flowers then ‘4n’ number of Violet flowers and at last ‘2m’ number of yellow flowers.  **Case (ii):**  First they should pick ‘n’ number of red flowers then ‘3n’ number of Green flowers.   1. What can be inferred from the PDAs constructed for the given scenario? (1 Mark) 2. The PDA constructed for Case i) is non deterministic 3. The PDAs constructed for Case i) and Case ii) are deterministic 4. The PDA constructed for Case ii) is non deterministic 5. The PDAs constructed for Case i) and Case ii) are non deterministic 6. What can be said about the language accepted by a PDA with 12 stack elements? (1 Mark) 7. Regular b) Context Free c) Recursive d) Nothing can be inferred 8. Write the Language for both cases. (5 marks) 9. Construction of PDA for both the cases. (8 marks) 10. Illustrate a PDA Diagram for the above cases. (6 Marks) 11. Check whether 2 consecutive red flowers followed by 4 consecutive green flowers can be picked using ID in Case i)’s PDA ? (4 Marks) | 25 | 4 | 3 | 4 | **4.2.1** |

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