 **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 -C***

**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 grammar given below:     1. What can be told about the above grammar? (1 Mark) 2. It has 3 unit productions 3. It has 6 unit productions 4. Certain terminals in the grammar cannot be derived 5. Few useless symbols are inherently present in the grammar 6. I: Regular grammars are a subset of Context Free Grammars (1 Mark)   II: Context free grammars are accepted by FSA   1. I is true and II is false 2. Both I and II are true 3. II is true and I is false 4. Both are false 5. List the terminals and non-terminals in the given grammar (3 Marks) 6. Check if the above grammar could generate the string “The flight include meal and the man read a book” (5 Marks) 7. Simplify the grammar and then convert the above CFG to Chomsky Normal Form (CNF) (8+7 Marks) | 25 | 3 | 2 | 4 | **4.2.1** |
| 2 | Consider the grammar given below which denotes Boolean expressions  Expr → Expr or Term | Term  Term → Term and Factor | Factor  Factor → not Factor | ( Expr ) | true | false   1. Which of the following lemma/ algorithm is not related to CFG? (1 Mark) 2. Substitution rule 3. Elimination of left recursion 4. Pumping lemma for regular languages 5. Elimination of useless symbols 6. A PDA can behave like a FSM when the stack size is\_\_\_\_ (1 Mark) 7. 1 b) 0 c)n d) infinite 8. Write leftmost derivation, rightmost derivation and parse tree for the string “true and not false or ( false and ( not true ) )” (6 Marks) 9. Is the grammar ambiguous? (2 Marks) 10. Convert the given grammar to a Pushdown Automata (9 Marks) 11. Show any two reachable Instantaneous Descriptions (IDs) starting from the initial ID for the string (6 Marks) | 25 | 3 | 2,3 | 4 | **4.2.1** |
| 3 | A school organized an annual day celebration for all students. The students participated in various games of the events. One of the game is picking the ball from the bag. The student has to pick the balls in the order specified. The one who is picking all the balls in the specified order at the earliest is the winner. The coloured balls are Red, Green, Violet, and Yellow.  Case (i): First, they should pick ‘n’ number of red balls then ‘m’ number of green balls then ‘m’ number of Violet balls and at last ‘n’ number of yellow balls.  Case (ii): First they should pick ‘n’ number of red balls then ‘m’ number of green balls then ‘m+n’ number of Violet balls.   1. Which of the following is not considered as an application of CFG? (1 Mark) 2. Natural Language processing 3. Syntax checking in programming languages 4. Speech recognition 5. Mathematical Induction 6. A symbol that cannot derive a terminal or any reachable symbol from the starting symbol is called as\_\_\_\_\_\_\_ (1 Mark) 7. Null symbol 8. Reachable symbol 9. Non reachable symbol 10. Useless symbol 11. Construction of PDA for the case (i) with transition diagram (8 Marks) 12. Construction of PDA for the case (ii) with transition diagram (12 Marks) 13. Instantaneous Description for picking 2 red balls, 1green ball and 2 violet balls from PDA in case (ii) (3 Marks) | 25 | 4 | 2,3 | 4 | **4.2.1** |

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