|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Register No.** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**SRM Institute of Science and Technology College of Engineering and Technology School of Computing**

**SET- A**

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu Academic Year: 2024-2025 (ODD)

**Test: CLAT-3 Date:** 08-11-2024

**Course Code & Title:** 21CSC301T – Formal Language and Automata **Duration:** 100 Minutes

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

Course Articulation Matrix:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No** | **Course Outcome** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| 1 | **CO1** | *-* | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 | 3 | *-* |
| 2 | **CO2** | *-* | 3 | 3 | - | - | - | - | - | - | - | - | - | 1 | 3 | *-* |
| 3 | **CO3** | *-* | 2 | 2 | - | - | - | - | - | - | - | - | - | 1 | 3 | *-* |
| 4 | **CO4** | *-* | 2 | 2 | - | - | - | - | - | - | - | - | - | 1 | 3 | *-* |
| 5 | **CO5** | *-* | 3 | 3 | - | - | - | - | - | - | - | - | - | 1 | 3 | *-* |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Part – A**  **(Answer ALL Questions)**  **(10 x 1 = 10 Marks)** | | | | | | |
| **Q. No** | **Question** | **Marks** | **BL** | **CO** | **PO** | **PI Code** |
| **1** | How many tuples are there in the formal definition of Turing Machine?   1. 5 2. **7 or 8** 3. 6 4. 9 | 1 | 1 | 4 | 3 | 3.5.1 |
| **2** | Identify the correct statement for the given transition  δ (q0, 1) -> [q1, a, L]   1. ‘1’ is not an input symbol 2. ‘a’ is an input symbol 3. **‘1’ is updated with ‘a’** 4. Tape head direction is right | 1 | 2 | 4 | 2 | 2.5.1 |
| **3** | Identify the right option   1. Finite automata are a subset of Turing machine 2. The language that are accepted by Turing Machine will also be accepted by Context free language 3. The language that are accepted by Context free language will also be accepted by Turing machine 4. Two-way finite automata accept the languages that are accepted by Turing Machine 5. Options i and ii are correct 6. Option ii only correct 7. Options iii and iv are correct 8. **Options i and iii are correct** | 1 | 1 | 4 | 2 | 2.6.2 |
| **4** | Pick the correct options  Group A   1. Subroutine 2. Checking off symbols 3. Deterministic Turing Machine 4. Semi Infinite Turing Machine   Group B   1. Accepting the multiples of 5 2. Blank symbol at one end 3. Multiplication operation 4. Palindrome 5. **i-C, ii-D, iii-A, iv-B** 6. i-D, ii-C, iii-B, iv-A 7. i-C, ii-A, iii-D, iv-B 8. i-A, ii-B, iii-C, iv-D | 1 | 2 | 4 | 3 | 3.5.1 |
| **5.** | Turing Machine is more powerful than FSM because   1. Tape movement is confined to one direction 2. It has no finite control 3. **It has the capability to remember arbitrary long sequences of input symbols** 4. It has no option for updation process | 1 | 1 | 4 | 2 | 2.6.2 |
| **6.** | Which of the following is true?   1. **The complement of a recursive language is recursive** 2. The complement of a recursively enumerable language is recursively enumerable 3. The complement of a recursive language is either recursive or recursively enumerable 4. The complement of a context-free language is context-free | 1 | 1 | 5 | 2 | 2.5.1 |
| **7.** | Ram and Shyam have been asked to show that a certain problem A is NP-Complete. Ram shows a polynomial time reduction from the 3-SAT problem to A, and Shyam shows a polynomial time reduction from A to 3-SAT. Which of the following can be inferred from reduction?   1. A is NP-hard but not NP-complete 2. A is in NP, but not NP-complete 3. **A is NP-complete** 4. It is neither NP-hard, nor in NP | 1 | 2 | 5 | 2 | 2.7.1 |
| **8.** | Assuming P ≠ NP, which of the following is TRUE?   1. NP-complete = NP 2. **NP-complete ∩ P = Ø** 3. NP-hard = NP 4. P = NP-complete | 1 | 2 | 5 | 2 | 2.5.1 |
| **9.** | If there exists a TM which when applied to any problem in the class, terminates if the correct answer is yes and may or may not terminate otherwise, is said to be   1. Stable 2. **Unsolvable** 3. Solvable 4. Unstable | 1 | 1 | 5 | 3 | 3.5.1 |
| **10.** | Identify Who am I?   1. There is no guarantee of acceptance by Turing Machine 2. I halt or loop at reject state or halt at accept state 3. I am the whole set of automata theory 4. Context free language 5. Recursive language 6. **Recursively enumerable language** 7. Regular language | 1 | 1 | 5 | 2 | 2.5.1 |

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