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## INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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**MLRS**

### III B.Tech I Sem Regular End Examination, January 2022
### Formal Languages and Automata Theory
### (CSE & IT)

Time: 3 Hours.                                            Max. Marks: 70

Note: 1. Question paper consists: Part-A and Part-B.
  2. In Part – A, answer all questions which carries 20 marks.
  3. In Part – B, answer any one question from each unit.
       Each question carries 10 marks and may have a, b as sub questions.

## PART- A
### (10*2 Marks = 20 Marks)

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|---|---|---|---|---|
| 1. | a) | What is a state and write about few types of states? | 2M | CO1 | BL1 |
| | b) | Write an input string that accept all stings containing 0's and 1's. | 2M | CO1 | BL1 |
| | c) | What are the properties of regular expressions? | 2M | CO2 | BL1 |
| | d) | Define NFA. | 2M | CO2 | BL1 |
| | e) | Write about left most derivation and right most derivation? | 2M | CO3 | BL1 |
| | f) | Define a Context free grammar. | 2M | CO3 | BL1 |
| | g) | Write rules of Chomsky Normal Form. | 2M | CO4 | BL1 |
| | h) | Write a procedure for eliminating unit productions? | 2M | CO4 | BL1 |
| | i) | Define Turing Machine. | 2M | CO5 | BL1 |
| | j) | Define Post correspondence problem. | 2M | CO5 | BL1 |

## PART- B
### (10*5 Marks = 50 Marks)

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|---|---|---|---|---|
| 2 | a) | Define Finite Automaton? Explain about the model of Finite Automaton? | 5M | CO1 | BL4 |
| | b) | Construct a NFA € equivalent to the regular expression 10(0+11)0*1? | 5M | CO1 | BL6 |

**OR**

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| 3 | Design a mealy machine to print out 1's complement of an input bit string? | 10M | CO1 | BL6 |

| | | | | |
|---|---|---|---|---|
| 4 | a) | Write the steps to construct regular expression from given DFA? | 5M | CO2 | BL2 |
| | b) | Discuss in brief about applications of pumping lemma? | 5M | CO2 | BL2 |

**OR**

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|---|---|---|---|---|
| 5 | Write in brief about the algebraic rules for regular expressions? | 10M | CO2 | BL2 |

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|---|---|---|---|---|---|
| 6 | a) | Obtain GNF S→AB, A→BS/b , B→SA/a ? | 5M | CO3 | BL3 |
| | b) | Define Ambiguous Grammar? Check whether the grammar S→aAB,A→bC/cd,C→cd,B→c/d Is Ambiguous or not? | 5M | CO3 | BL3 |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 7 | | Construct a Left most Derivation for the string 0011000using the grammar S→A0S/0/SS, A→S1A/10 ? | 10M | CO3 | BL6 |

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|---|---|---|---|---|---|
| 8 | a) | Construct Turing machine for the languages containing the set of all strings of balanced paranthesis | 5M | CO4 | BL6 |
| | b) | Discuss in brief about decision properties of Context free languages? | 5M | CO4 | BL2 |

**OR**

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| 9 | | Design Turing machine and its transition diagram to accept the language $L = \{ a^n b^n \mid n >= 1\}$ | 10M | CO4 | BL6 |

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| 10 | a) | Explain about Chomskey Hierarchy in detail. | 5M | CO5 | BL4 |
| | b) | Explain about Universal Turing Machine? | 5M | CO5 | BL4 |

**OR**

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|---|---|---|---|---|---|
| 11 | | What is decidability? Explain in brief about any two undecidable problems? | 10M | CO5 | BL4 |

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