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**Presidency University**

**Bengaluru**

**School Of Computer Science and Engineering & Information Science**

**Summer Term End-Term Examinations, Aug 2024**

**Date**: 12/08/2024

**Time**: 1: 00pm to 4.00pm

**Max Marks**: 100

**Weightage**: 50%

**Odd Semester**: 2023 - 24

**Course Code**: CSE 2018

**Course Name**: Theory of Computation

**Department: CSE**

**Instructions:**

1. *Read the all questions carefully and answer accordingly.*
2. *Do not write any matter on the question paper other than roll number.*

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| **Q.No** | **Questions** | **Marks** | **CO** | **RBT** |
| 1 | 1. Write the Language to accept the string of a’s having at least one a. | 4 | CO1 | L1 |
| 1. Consider the string 011 over the binary alphabet. Write all the prefixes, suffixes and substrings of the above string. | 6 | CO1 | L2 |
| 1. Define any 5 operations of strings with an example for each | 10 | CO1 | L3 |
| OR | | | | |
| 2 | 1. List the applications of Push Down Automata | 4 | CO1 | L1 |
| 1. If L={ set of all strings that begins and ends with 1 with string length 3 on } Then find x 3 , x 1  and x 0 of the string of L | 6 | CO1 | L2 |
| 1. Define any 5 operations on languages with an example for each | 10 | CO1 | L3 |

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| 3 | 1. Design NFA that accepts language of strings ending with ab/ba over   ∑ = {a, b} | 10 | CO2 | L2 |
| b. Minimize the following DFA using state elimination method. | 10 | CO2 | L3 |

OR

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| 4 | 1. Draw a DFA for the language L={set of all strings that starts with aba on   ∑ = {a, b} } | 10 | CO2 | L2 |
| b. Convert the following €-NFA to its equivalent DFA. | 10 | CO2 | L3 |

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| 5 | a. Prove that the language  is non- regular language using pumping lemma theorem. | 10 | CO3 | L1 |
| b. i.The set of all strings that begin with 110.  ii.The set of all strings that contain 1011.  iii. The set of all strings that contain exactly three 1’s.  iv. The set of all strings such that the number of 0’s is odd.  v. The set of all strings of 0’s and 1’s not containing 101 as a substring. | 10 | CO3 | L2 |

OR

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| 6 | Prove that the language  is non- regular language using pumping lemma theorem. | 10 | CO3 | L1 |
| 1. L={anbn, n is a multiple of three} find CFG | 10 | CO3 | L2 |

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| 7 | 1. Obtain NPDA to accept language L(G)={w : w ϵ {a, b} | 10 | CO4 | L3 |
| 1. Define NPDA and explain the Transition Function of NPDAs. | 10 | CO4 | L1 |

OR

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| 8 | 1. Obtain PDA to accept language L(G)={ : n>=1, Σ={a, b}\* } | 10 | CO4 | L3 |
| 1. Define NPDA and explain the Transition Function of NPDAs. | 10 | CO4 | L1 |

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| 9 | a. Consider the following grammar  S → bB/Aa  A→b/ bS/ aAA  B → a/ aS/ bBB  Find: Leftmost and right most derivation For string bbaababa and Also findderivation tree | 10 | CO3 | L2 |
| b. Convert the following NFA to DFA using subset construction method | 10 | CO2 | L3 |

OR

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| 10 | 1. Define PDA and explain the stack operations on PDA | 10 | CO4 | L2 |
| 1. Define DFA, NFA, €-NFA and explain the difference between the three machines | 10 | CO1 | L1 |