DEPARTMENT OF

**INFORMATION SCIENCE & ENGINEERING**

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| Date | 13th August 2021 | Maximum Marks | 50 |
| Course Code | 18IS46 | Duration | 120 Min |
| Sem | IV Semester | Closed Book Online Improvement Test | |
| **THEORY OF COMPUTATION** | | | |

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| **Sl. No.** | **Questions** | **M** | **BT** | **CO** |
| 1.a | Design PDA for the following languages:  L1 = {a3bncn | n ≥ 0} by using final state.  L2 = {ambn | m n} by using empty stack and also show the ID made by the automata for the string a2b3 | 08 | L5 | CO1 |
| 1.b | Define a DPDA. | 02 | L1 | CO1 |
| 2 | Design a TM to compute max (n1, n2) and also show the action of TM for input n1 = 1, n2 = 2. | 10 | L5 | CO1 |
| 3.a | Differentiate between FA/PDA vs. TM with respect to:  a. Tape and head  b. Halt state and final states | 4 | L2 | CO1 |
| 3.b | Represent the following grammar in CNF without useless productions: | 6 | L3 | CO3 |
| 4.a | Prove that none of the following grammars generate: | 5 | L4 | CO3 |
| 4.b | Define left linear grammar and obtain the same for the given DFA: | 5 | L3 | CO3 |
| 5.a | Prove that multi tape and single tape turing machine are equivalent. | 6 | L4 | CO2 |
| 5.b | Check whether the following grammar is ambiguous. Prove your answer.  S → AB | C  A → aAb | ab  B → cBd | cd  C → aCd | aDd  D → bDc | bc | 4 | L3 | CO3 |

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

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| Marks Distribution | Particulars | | CO1 | CO2 | CO3 | CO4 | L1 | L2 | L3 | L4 | L5 | L6 |
| Test | Max Marks | 24 | 6 | 20 | -- | 2 | 4 | 15 | 11 | 18 | -- |

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