DEPARTMENT OF

**INFORMATION SCIENCE & ENGINEERING**

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| Date | 17th July 2021 | Maximum Marks | 50 |
| Course Code | 18IS46 | Duration | 120 Min |
| Sem | IV Semester | Closed Book Online Test-1 | |
| **THEORY OF COMPUTATION** | | | |

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| **Sl. No.** | **Questions** | **M** | **BT** | **CO** |
| 1.a | List the steps to convert the given CFG to equivalent PDA by empty stack. Convert the CFG below to its equivalent PDA by empty stack. | 05 | L3 | CO3 |
| 1.b | Define unrestricted grammar. Give unrestricted grammar to generate the language L = {ww | w {a , b}\*}. Show that string abbabb L. | 05 | L6 | CO3 |
| 2.a | How to find an equivalent CFG from a given PDA? Convert the following PDA to a grammar: P = ({p,q}, {0,1}, {X,Z}, δ, p, z, Ф ) where δ is given by: | 07 | L3 | CO1 |
| 2.b | Discuss the applications of Turing machine. | 03 | L2 | CO1 |
| 3.a | Design an NPDA to accept the language L = and trace the PDA for the string ‘ababba’. ∑ = {a,b}. | 06 | L4 | CO1 |
| 3.b | Let L be L(M1) for some PDA with final state M1=(Q, Σ, , δ, q0, z0, F). Prove that there exists an empty stack PDA M2 such that L=L(M2). | 04 | L2 | CO1 |
| 4.a | Define Turing Machine and the language of Turing Machine. Design TM to perform the string copy operation. The string is constructed over ∑ = {a, b}. Trace the machine for string bab. | 08 | L5 | CO1 |
| 4.b | Describe the language generated by the unrestricted grammar with productions: | 02 | L3 | CO3 |
| 5.a | Define DPDA. Construct DPDA equivalent to the DFA whose transition table is as below. Here A is Start state and B is final state.   |  |  |  | | --- | --- | --- | | **δ** | **a** | **b** | | **A** | **A** | **B** | | **B** | **C** | **A** | | **C** | **A** | **B** | | 04 | L4 | CO1 |
| 5.b | Write a note on:   1. Multi-tape Turing Machine. 2. Multidimensional Turing Machine. | 06 | L1 | CO1 |

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 | 38 | -- | 12 | -- | 6 | 7 | 14 | 10 | 8 | 5 |

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