DEPARTMENT OF

**INFORMATION SCIENCE & ENGINEERING**

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| Date | 4th June 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 | Write NFA for the following:  i) To recognize strings that start and end with same character for ∑ = {a,b}.  ii) The set of all strings containing exactly two occurrences of 10 over ∑ = {0,1}. | 04 | L5 | CO1 |
| 1.b | Obtain an ε-NFA for the following regular expressions:   1. ((ab)\*b+ab\*)\* 2. (a\*+b\*+c\*) | 06 | L2 | CO1 |
| 2.a | Find CFG’s to generate the following languages:  i) ibjck | i = j or i = k}  ii) {ibj | i < 2j} | 04 | L5 | CO3 |
| 2.b | Obtain an equivalent DFA corresponding to the -NFA given below. | 06 | L3 | CO2 |
| 3.a | Given ∑ = {0, 1}, Obtain an equivalent DFA corresponding to the NFA given below using subset construction method.   |  |  |  | | --- | --- | --- | | **δ** | **0** | **1** | | **-> p** | **{p,q}** | **{p}** | | **q** | **Ф** | **{r}** | | **\*r** | **{p,r}** | **{q}** | | 05 | L3 | CO2 |

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| 3.b | State Pumping Lemma for Regular Languages. By using P.L, Prove that  L = **| n≥1}** is not regular. | 05 | L3 | CO1 |
| 4.a | Write regular expressions for the following languages: Σ = {0,1}   1. The set of all strings that contain exactly three 1’s. 2. The set of even length strings 3. The set of all strings of 0’s and 1’s not containing 101 as a substring. | 06 | L4 | CO3 |
| 4.b | Obtain Regular Expression for the given Finite Automata using State Elimination Method.  https://www.gatevidyalay.com/wp-content/uploads/2018/08/DFA-to-Regular-Expression-Conversion-Problem-04.png | 04 | L3 | CO1 |
| 5.a | 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 | 04 | L3 | CO3 |
| 5.b | Show that class of regular languages is closed under Intersection and Complementation. | 04 | L2 | CO2 |
| 5.c | What language over {a,b} does the CFG with productions  S -> aaS | bbS | Saa | Sbb | abSab | abSba | baSba | baSab | generates? | 02 | L4 | 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 | 19 | 15 | 16 | -- | -- | 10 | 24 | 8 | 8 | -- |

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