Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **17CS2021** | **Duration :** | **3hrs** |
| **Sub. Name :** | **THEORY OF COMPUTATION** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Construct the DFA for the following languages L1={ab2wb2 : wε{a,b}\*}  L2={w: wε{a,b}\* and |w| mod 3 ≠ 0} | CO1 | 10 |
| b. | Convert the following NFA to DFA.  Image result for nfa with epsilon to dfa conversion | CO4 | 10 |
| **(OR)** | | | | |
| 2. | a. | Minimize the DFA given below.  C:\Users\Salaja\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\799EC142.tmp | CO3 | 10 |
| b. | Construct NFA for the following languages.  L1={((01)\*01)+(10\*)}  L2={(01+0\*)\*} | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Construct Regular Expression for the given finite automata. (q0 and q3 are final states) | CO3 | 10 |
| b. | Show that the language L={wwR : wε{a,b}\*} is not regular. | CO6 | 10 |
| **(OR)** | | | | |
| 4. | a. | Construct Left Linear and Right Linear grammars for the language represented by the following Finite Automata:  Image result for finite automata to left linear grammar | CO5 | 10 |
| b. | Prove that the regular languages are closed under the following properties:   1. Union 2. Intersection 3. Reverse 4. Complement 5. Closure | CO6 | 10 |
|  |  |  |  |  |
| 5. | a. | Construct CFG for the languages  L1= {anbmcn : n≥0, m≥1}  L2={w: wɛ{a,b}\* and na(w) = nb(w)+1} | CO1 | 10 |
| b. | Construct leftmost derivation, rightmost derivation and parse tree for the string “001110” using the following grammar and also show that the following grammar is ambiguous  S → SS | 0S1 | 1S0 | λ | CO5 | 10 |
| **(OR)** | | | | |
| 6. | a. | Simplify the following CFG:  S 🡪ABDd | CDc  A 🡪 BD  B 🡪bB | λ  C 🡪cC  D 🡪dD | λ | CO3 | 10 |
| b. | Convert the following grammar into Chomsky’s and Greibach Normal Forms  S 🡪aAbB | bB  A 🡪aAa | aa  B 🡪bB | b | CO3 | 10 |
|  |  |  |  |  |
| 7. | a. | Construct Non-deterministic Pushdown Automata for the languages:  L1={ anbmcn+m, n≥0, m≥ 0}  L2 = L(b\*abab\*) | CO1 | 15 |
| b. | Find the equivalent PDA for the below-given CFG:  S 🡪aAB | a  A 🡪aBC  B 🡪bB | bC  C 🡪c | CO4 | 5 |
| **(OR)** | | | | |
| 8. | a. | Design a Tturing machine for the language:  L1= { 0n21n: n≥1}  Also, show that the string “00211” is a member of this language. | CO3 | 10 |
| b. | Elaborate Chomsky’s hierarchy of the formal languages with suitable examples for each. | CO2 | 10 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Explain in detail the variations of the Turing machine. | CO2 | 15 |
| b. | Define the following:   1. Recursive Language 2. Recursively Enumerable Language | CO4 | 5 |