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

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**End Semester Examination – Nov/Dec – 2018**

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| **Code : 14CS2047** |  | **Duration :** | **3hrs** |
| **Sub. Name : THEORY OF COMPUTATION** |  | **Max. marks :** | **100** |

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Construct the NFA for the following Languages over ∑ = {0,1}  **= {strings with ‘010’ or ‘101’ as substring}** | CO1 | 10 |
| b. | Design DFA for the following specifications over ∑ = {a,b}:  L3 = Set of strings with even number of a’s and odd number of b’s  L4 = Set of strings ending with “bbaa” | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Convert the following NFA to DFA. (Note: ε is equivalent to λ, q1 is the final state)  Image result for nfa to dfa | CO1 | 10 |
| b. | Minimize the given DFA(Note: q1, q2, q4 are final states) | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Construct the Regular Expression for the given automata.(Note: q1, q2 are final states)  C:\Users\Salaja\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\61350A9E.tmp | CO2 | 10 |
|  | b. | Find the intersection of the following DFAs: (Note: 1 is the final state in Fig. 1 and 0 & 1 are final states in Fig. 2 )   |  |  | | --- | --- | | Fig. 1 | Fig 2 | | CO1 | 10 |
| (OR) | | | | |
| 4. | a. | Convert the given Finite Automata into left linear and right linear grammar: (Note: 3 is the final state)  Related image | CO2 | 10 |
| b. | Write the leftmost, rightmost derivation and parse tree for the string ‘aaabbabbba’ based on the CFG given below | CO2 | 10 |
|  |  |  |  |  |
| 5. | a. | Simplify the following grammar by eliminating λ – productions, unit productions and useless productions  **S → aA | aBB**  **A → aaA | λ**  **B → bB | bbC**  **C → B** | CO2 | 10 |
| b. | Use CYK membership algorithm to find whether “abbab” is a member of the language represented by the grammar.  **S → AB**  **A → BB | a**  **B → AB | b** | CO1 | 10 |
| (OR) | | | | |
| 6. | a. | Construct NPDA for the following language  Check whether the string ‘aaaaaab’ is a part of the language. | CO1 | 10 |
| b. | Construct NPDA for the CFG given below | CO2 | 10 |
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| 7. | a. | Show that context free languages are closed under Union, Concatenation and Closure. | CO3 | 10 |
| b. | Prove that the language **L={anbncn : n>0}** is not context free language using pumping lemma. | CO3 | 10 |
| (OR) | | | | |
| 8. | a. | Construct the turing machine for the language **L= {ambmcm : m ≥ 1}** | CO1 | 10 |
| b. | Illustrate the minor variations of Turing Machine theme. | CO3 | 10 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | State when a language is said to be a member of the class NTIME(T(n)). Prove that the language **L = {ww | w ϵ {a,b}\*}** is NTIME(n). | CO3 | 10 |
| b. | Exhibit the relation between the classes of formal languages as a hierarchy and describe each of them. | CO3 | 10 |