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| **Scheme of Valuation/Answer Key****(Scheme of evaluation (marks in brackets) and answers of problems/key)****APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**FIFTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019 |
| **Course Code: CS301** |
| **Course Name: THEORY OF COMPUTATION** |
| Max. Marks: 100 |  | Duration: 3 Hours |
| **PART A** |
|  |  | ***Answer all questions, each carries3 marks.*** | Marks |
| 1 |  | Finite state automata tuple explanationModel | (2)(1) |
| 2 |  | DFA for the language 101\* | (3) |
| 3 |  | regular expression. | (3) |
| 4 |  | two-way finite automata explanation | (3) |
| **PART B** |
| ***Answer any two full questions, each carries9 marks.*** |
| 5 | a) | Regular expression corresponding to the language of the given DFA. | (4.5) |
|  | b) | Prove the equivalence of NFA and ε-NFA. | (4.5) |
| 6 | a) | Convert the ε-NFA to NFA. | (4.5) |
|  | b) | Equivalence of regular expression and finite state automata | (4.5) |
| 7 | a) | Compare the transition functions of DFA, NFA and ε-NFA. | (4.5) |
|  | b) | Minimize the states of the DFA given below | (4.5) |
| **PART C** |
| ***Answer all questions, each carries3 marks.*** |
| 8 |  | Give the CFG for the language **wwR** where w is string of zeroes and ones.  | (3) |
| 9 |  | What is a derivation tree? Give an example | (2)(1) |
| 10 |  | Compare DPDA and NPDA. | (3) |
| 11 |  | Explain any two closure properties of CFL.( 1.5 x 2) | (3) |
| **PART D** |
| ***Answer any two full questions, each carries9 marks.*** |
| 12 | a) | Proof | (4.5) |
|  | b) | PDA for the language **wcwR**. | (4.5) |
| 13 | a) | Prove the equivalence of PDA accepting by empty stack and final states | (4.5) |
|  | b) | Simplification of grammar to Chomsky normal form. | (2)(2.5) |
| 14 | a) | Convert to Greibach Normal form. {S→AB, A→SA|AA|a, B→SB|b} | (4.5) |
|  | b) | Prove the equivalence of CFG and PDA. | (4.5) |
| **PART E** |
| ***Answer any four full questions, each carries10 marks.*** |
| 15 | a) | Proof | (5) |
|  | b) | Universal Turing Machine  | (5) |
| 16 | a) | Pumping lemma for CFL | (5) |
|  | b) | Halting problem | (5) |
| 17 | a) | Linear Bounded Automata | (5) |
|  | b) | Chomsky hierarchy  | (5) |
| 18 | a) | Context sensitive grammar for the language anbncnwhere n>0. | (5) |
|  | b) | Multi-tape Turing Machine | (5) |
| 19 | a) | Design a Turing machine that accepts the language 1n0n where n>0. | (5) |
|  | b) | What is a non-deterministic Turing Machine?Give an example. | (3)(2) |
| 20 | a) | Turing machine tuple explanation Model | (3)(2) |
|  | b) | Recursive Recursively enumerable languages | (2.5)(2.5) |
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