Reg. No. : | | | | | | | | | | |

Question Paper Code: 35204

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Fifth Semester

Computer Science and Engineering

01UCS504 – THEORY OF COMPUTATION

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Prove that "If *p* is a prime number bigger than 2, then *p* is odd".
2. Define NFA with ϵ transition.
3. Define regular expression with example.
4. List the algorithms of minimizing the DFA.
5. Construct a CFG for the language *L={an, bn} n>=1*.
6. Define Pushdown Automata.
7. Explain acceptance of PDA with empty stack.
8. Define Instantaneous description of TM.
9. State some of NP-complete problems.
10. Define reducibility.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Prove by mathematical induction that for every integer $n \geq 0$ the number $4^{2n+1} + 3^{n+2}$ is multiple of 13. (6)

    (ii) Show that a language L is accepted by some DFA if and only if L is accepted by some NFA. (10)

Or

(b) Show that a language L is accepted by some DFA if and only if L is accepted by some NFA. (16)

12. (a) Let *r* be a regular expression. Then prove that there exists a NFA with ϵ transition that accept *L(r)*. (16)

Or

(b) Construct a DFA with reduced state equivalent to the regular expression 10 + (0+1) 0 * 1. (16)

13. (a) Construct a PDA accepting *{a n b m a n | m, n >= 1}* by empty stack. (16)

Or

(b) Find a Grammar in CNF equivalent to S→aAbB , A→aA | a , B→bB|b. (16)

14. (a) Design a TM to compute *f(m, n) = m* n V m, n € N*. (16)

Or

(b) Explain how the multiple tracks in a Turing Machine can be used for testing given positive integer is a prime or not. (16)

15. (a) Show that halting problem of Turing Machine is undecidable. (16)

Or

(b) Define Computational Complexity? Explain whether the class of Problems that can be solved in polynomial time is equivalent to the class of non-deterministic polynomial problems i.e whether P=NP. (16)

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