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

Question Paper Code: 35204

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

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. Differentiate L^* and L^+.
4. Write the RE to denote a language *L* over the input set *{a, b}* such that 3rd character from the right end of the string is always *a*.
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≥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) (i) Let *L* be a set accepted by a NFA and then prove that there exists a DFA that accept *L*. (8)

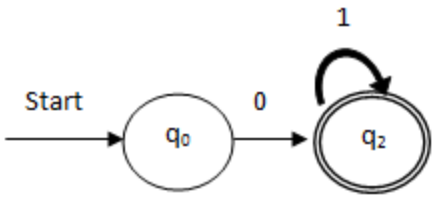
(ii) Convert the following NFA to a DFA. (8)

State \ Input	x	y
→ a	{a}	{a, b}
b	{c}	{c}
* c	ϕ	ϕ

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) (i) Construct regular expression for the given automata using R_{ij} formula. (10)



(ii) Design a finite automaton for the regular expression $(0+1)^*(00+11)(0+1^*)$. (6)

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

Or

(b) (i) Explain the types of grammar with examples. (6)

(ii) Construct a PDA to accept the language $L = \{a^n b^m c^n \mid n \geq 1\}$ by empty stack and by final state. (10)

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) (i) State and prove post correspondence problem and Give the example. (8)

(ii) Define diagonalization language. Show that the language L_d is not a recursively enumerable language. (8)

35204