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

Question Paper Code: 31254

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

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. Give an 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. Draw the transition diagram of a Turing Machine that can accept the language denoted by regular expression 11*.
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) The NFA with states {1, 2, 3, 4, 5} and input alphabet {a, b} has the following transition table. (i) Calculate $\partial(1, ab)$ (ii) Calculate $\partial(1, abab)$. (16)

	a	b
1	{1, 2}	{1}
2	{3}	{3}
3	{4}	{4}
4	{5}	Φ
5	Φ	{5}

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 equivalent to the following regular expression 01*+1. (16)

13. (a) Convert to Greibach Normal Form from the grammar G=({A1, A2, A3},{a, b},P,A1) where P consists of the following A1 ->A2 A3; A2 ->A3 A1 |b;A3 ->A1 A2 |a. (16)

Or

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

14. (a) Suppose L_1 is the context-free language generated by productions {B-> AB| ε, A-> 011|1} and L_2 is the context free language generated by the productions {C-> DC| ε, D-> 01}. Construct the grammar generating language L_1L_2. (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)
