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

Question Paper Code: 35204

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 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. Define finite automata.

2. Define NFA with ϵ transition.

3. Define regular expression with example.

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. Define Instantaneous description of TM.

8. Find L(G) where G= ({S} ,{0,1}, {S->0S1 ,S->0A| 0| 1B |1 , A->0A|0, B->1B|1 },S).

9. Is travelling salesman problem a NP or P Problem? Justify.

10. What are recursive sets?

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Prove that a language L is accepted by ϵ- NFA, then L is accepted by an NFA. (16)

Or

(b) (i) Let L be a set accepted by a NFA and then prove that there exists a DFA that accept L. (8)

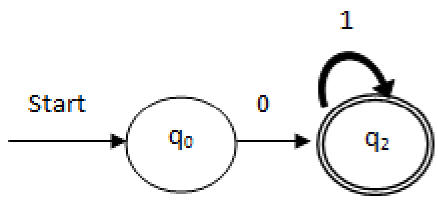
(ii) Convert the following NFA to a DFA. (8)

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

12. (a) Construct a DFA with reduced state equivalent to the regular expression 10 + (0+1) 0 * 1 (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) (i) Find the language generated by the grammar G with variable S, A, B terminal a, b and productions S → aB, B → b, B → bA, A → ab. (8)

(ii) If G is a grammer S → Sba | a Prove that G is a ambiguous. (8)

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) (i) Prove that $L1$ and $L2$ cannot be CFL by applying pumping Lemma. (6)

$$L1 = \{a^m b^m c^m \quad : m \geq 0\}$$
$$L2 = \{a^m b^k c^m d^k \quad : m, k \geq 0\}$$

(ii) Describe how TM is useful for computing arithmetic functions addition and proper subtraction? (10)

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 for two recursive language L1 and L2 each of the following is recursive

(i) L1∩ L2 (ii) L1U L2 (iii) L1 ‘ (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)