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

Question Paper Code: 45204

B.E. / B.Tech. DEGREE EXAMINATION AUGUST 2021

Fifth Semester

Computer Science and Engineering

14UCS504 – THEORY OF COMPUTATION

(Regulation 2014)

Duration: 1:45 hour Maximum: 50 Marks

PART A - (10 x 2 = 20 Marks)

(Answer any ten of the following questions)

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.
11. Differentiate DFA and NFA.
12. When two states are equivalent and distinguishable.

13. Define the language generated by a PDA.

14. Design a turing machine for computing the function $f(x) = x + 1$.

15. Give some examples of NP-complete problems

PART – B (3 x 10= 30 Marks)

(Answer any three of the following questions)

16. Prove that for every integer n≥0 the number $4^{2n+1} + 3^{n+2}$ is multiple of 13. (10)

17. Construct the Ɛ- NFA for the regular expression (1+0)*1(1+0). (10)

18. Let $S \rightarrow aB/bA,\ A \rightarrow aS/bAA/a,\ B \rightarrow bS/aBB/b$. Show that $S \Rightarrow aaabbabbba$ and construct a derivation tree whose yield is in *"aaabbabbba"*. (10)

19. Begin with grammar *S -> 0A0/1B1/BB, A -> C, B -> S/A, C -> S/ε* and simplify using safe order (10)

20. State post correspondence problem. Let $\sum = \{a, b\}^*$. Let *A* and *B* be lists of three strings as given below

A = {b, bab^3, ba} B = {b^3, ba, a). Does this instance of PCP have a solution? (10)