

2074  
B.E. (Computer Science and Engineering)  
Fifth Semester  
CS-505: Theory of Computation

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

x-x-x

Q1.	a) State some applications where automata theory is used. b) State Turing machine formalism. c) Differentiate between tractable and Intractable problems. d) List closure properties of Regular languages. e) Give formal definition of Pushdown automata (PDA).	10
<b>Section-A</b>		
Q2.	a) Design a Deterministic finite automata to accept strings over alphabets $\Sigma = (a, b)$ containing even numbers of a's b) Prove that "A language L is accepted by DFA if and only if L is accepted by some NFA"	6 4
Q3.	a) Give regular expression for following: i) Binary string containing at least one 11 and at least one 00. ii) strings with even number of a's. iii) string in which third symbol from end is 'c' over {a,b,c} b) Explain pumping lemma for regular sets.	6 4
Q4.	a) Define Context free grammar. Write the procedure to simplify context free grammar. b) Explain Chomsky hierarchy.	5 5
<b>Section-B</b>		
Q5.	a) Define PDA. Does PDA have memory? Justify your answer. b) Construct a PDA equivalent to the following grammar: S → aAA A → aS/bS/a	3 7
Q6.	a) Define the basic model of Turing machine and discuss briefly techniques for Turing machine construction. b) Construct Turing machine for accepting palindromes.	5 5
Q7.	Write a short note on following a) P and NP completeness b) Recursive and Recursively enumerable Languages.	5 5